JAWAPAN

BAB 1: BENTUK PIAWAI

1.1

A

Nombor *Number*	1 angka bererti *1 significant figure*	2 angka bererti *2 significant figures*	3 angka bererti *3 significant figures*
1. 5 834	6 000	5 800	5 830
2. 72 051	70 000	72 000	72 100
3. 685.4	700	690	685
4. 14.59	10	15	14.6
5. 3.608	4	3.6	3.61
6. 2.193	2	2.2	2.19

B

Nombor *Number*	1 angka bererti *1 significant figure*	2 angka bererti *2 significant figures*	3 angka bererti *3 significant figures*
1. 0.1365	0.1	0.14	0.137
2. 0.4792	0.5	0.48	0.479
3. 0.6028	0.6	0.60	0.603
4. 0.03174	0.03	0.032	0.317
5. 0.02549	0.03	0.025	0.0255
6. 0.007206	0.007	0.0072	0.00721

C

1. $46\ 925 - 1\ 305 = 45\ 620$
$\qquad\qquad\qquad = 45\ 600$ (3 a.b.)

2. $6.89 + 0.9 = 7.79$
$\qquad\qquad = 8$ (1 a.b.)

3. $7.2 \times 3.41 = 24.552$
$\qquad\qquad\quad = 24.6$ (3 a.b.)

4. $523.88 \div 2.8 = 187.1$
$\qquad\qquad\qquad = 190$ (2 a.b.)

5. $\dfrac{14.6 \times 5.02}{0.8} = 91.615$
$\qquad\qquad\qquad = 92$ (2 a.b.)

6. $(100 - 2.62) \div 36 = 97.38 \div 36$
$\qquad\qquad\qquad\qquad = 2.705$
$\qquad\qquad\qquad\qquad = 2.71$ (3 a.b.)

7. $10.4 \times (8.2 + 3.3) = 10.4 \times 11.5$
$\qquad\qquad\qquad\qquad = 119.6$
$\qquad\qquad\qquad\qquad = 120$ (2 a.b.)

8. $3.62 \times 0.25 \div 0.05 = 0.905 \div 0.05$
$\qquad\qquad\qquad\qquad\quad = 18.1$
$\qquad\qquad\qquad\qquad\quad = 20$ (1 a.b.)

1.2

A

Nombor *Number*	Bentuk piawai *Standard form*
1. 480	4.8×10^2
2. 6 772	6.772×10^3
3. 25 900	2.59×10^4
4. 1 240 000	1.24×10^6
5. 92.6	9.26×10^1
6. 507.8	5.078×10^2
7. 0.361	3.61×10^{-1}
8. 0.098	9.8×10^{-2}
9. 0.00003	3×10^{-5}
10. 0.000752	7.52×10^{-4}
11. 0.0000083	8.3×10^{-6}
12. 0.00104	1.04×10^{-3}

B

Bentuk piawai *Standard form*	Nombor *Number*
1. 9.6×10^2	960
2. 8.54×10^3	8 540
3. 2×10^5	200 000
4. 7.3×10^4	73 000
5. 6.8×10^5	680 000
6. 5.01×10^6	5 010 000
7. 6.524×10^{-1}	0.6524
8. 9×10^{-3}	0.009
9. 7.15×10^{-2}	0.0715
10. 3.6×10^{-4}	0.00036
11. 8.02×10^{-5}	0.0000802
12. 4.17×10^{-6}	0.00000417

C

1. $6.2 \times 10^5 + 3.7 \times 10^4$
$= 6.2 \times 10^5 + 0.37 \times 10^5$
$= (6.2 + 0.37) \times 10^5$
$= 6.57 \times 10^5$'

2. $7 \times 10^2 + 4.5 \times 10^3$
$= 0.7 \times 10^3 + 4.5 \times 10^3$
$= (0.7 + 4.5) \times 10^3$
$= 5.2 \times 10^3$

3. $6.4 \times 10^7 + 2.15 \times 10^8$
$= 0.64 \times 10^8 + 2.15 \times 10^8$
$= (0.64 + 2.15) \times 10^8$
$= 2.79 \times 10^8$

4. $9.1 \times 10^{-3} + 3 \times 10^{-2}$
$= 0.91 \times 10^{-2} + 3 \times 10^{-2}$
$= (0.91 + 3) \times 10^{-2}$
$= 3.91 \times 10^{-2}$

5. $8.03 \times 10^{-5} + 3.4 \times 10^{-6}$
$= 8.03 \times 10^{-5} + 0.34 \times 10^{-5}$
$= (8.03 + 0.34) \times 10^{-5}$
$= 8.37 \times 10^{-5}$

D

1. $5.3 \times 10^6 - 4 \times 10^5$
$= 5.3 \times 10^6 - 0.4 \times 10^6$
$= (5.3 - 0.4) \times 10^6$
$= 4.9 \times 10^6$

2. $8.5 \times 10^4 - 9.8 \times 10^3$
$= 8.5 \times 10^4 - 0.98 \times 10^4$
$= (8.5 - 0.98) \times 10^4$
$= 7.52 \times 10^4$

3. $6.05 \times 10^9 - 3.2 \times 10^8$
$= 6.05 \times 10^9 - 0.32 \times 10^9$
$= (6.05 - 0.32) \times 10^9$
$= 5.73 \times 10^9$

4. $3 \times 10^{-4} - 1.9 \times 10^{-5}$
$= 3 \times 10^{-4} - 0.19 \times 10^{-4}$
$= (3 - 0.19) \times 10^{-4}$
$= 2.81 \times 10^{-4}$

5. $4.08 \times 10^{-6} - 7.8 \times 10^{-7}$
$= 4.08 \times 10^{-6} - 0.78 \times 10^{-6}$
$= (4.08 - 0.78) \times 10^{-6}$
$= 3.3 \times 10^{-6}$

E

1. $48\ 000 \times 300 = 14\ 400\ 000$
$\qquad\qquad\qquad = 1.44 \times 10^7$

2. $1.82 \times 10^{-4} \times 5 \times 10^9 = 1.82 \times 5 \times 10^{-4\ +\ 9}$
$\qquad\qquad\qquad\qquad = 9.1 \times 10^5$

3. $3 \times 10^5 \times 7.1 \times 10^2$
$= 3 \times 7.1 \times 10^{5+2}$
$= 21.3 \times 10^7$
$= (2.13 \times 10^1) \times 10^7$
$= 2.13 \times 10^8$

4. $6.9 \times 10^{-6} \times 2.4 \times 10^{-3}$
$= 6.9 \times 2.4 \times 10^{-6+(-3)}$
$= 16.56 \times 10^{-9}$
$= (1.656 \times 10^1) \times 10^{-9}$
$= 1.656 \times 10^{-8}$

5. $8.2 \times 10^3 \times 4.5 \times 10^{-9}$
$= 8.2 \times 4.5 \times 10^{3+(-9)}$
$= 36.9 \times 10^{-6}$
$= (3.69 \times 10^1) \times 10^{-6}$
$= 3.69 \times 10^{-5}$

F

1. $6.09 \times 10^5 \div (3 \times 10^2)$
$= (6.09 \div 3) \times 10^{5-2}$
$= 2.03 \times 10^3$

2. $\dfrac{7 \times 10^9}{2.5 \times 10^4} = \dfrac{7}{2.5} \times 10^{9-4}$
$\qquad\qquad = 2.8 \times 10^5$

3. $\dfrac{0.00366}{2.4 \times 10^{-6}} = \dfrac{3.66 \times 10^{-3}}{2.4 \times 10^{-6}}$
$\qquad\qquad\quad = \dfrac{3.66}{2.4} \times 10^{-3-(-6)}$
$\qquad\qquad\quad = 1.525 \times 10^3$

4. $\dfrac{4.88 \times 10^8}{8\,000} = \dfrac{4.88 \times 10^8}{8 \times 10^3}$
$\qquad\qquad\; = \dfrac{4.88}{8} \times 10^{8-3}$
$\qquad\qquad\; = 0.61 \times 10^5$
$\qquad\qquad\; = (6.1 \times 10^{-1}) \times 10^5$
$\qquad\qquad\; = 6.1 \times 10^4$

5. $\dfrac{2.3 \times 10^{-7}}{0.0005} = \dfrac{2.3 \times 10^{-7}}{5 \times 10^{-4}}$
$\qquad\qquad\; = \dfrac{2.3}{5} \times 10^{-7-(-4)}$
$\qquad\qquad\; = 0.46 \times 10^{-3}$
$\qquad\qquad\; = (4.6 \times 10^{-1}) \times 10^{-3}$
$\qquad\qquad\; = 4.6 \times 10^{-4}$

G

1. Negeri P: Paling ramai pengundi
Negeri R: Paling sedikit pengundi

Beza bilangan pengundi antara negeri P dengan negeri R
$= 1.49 \times 10^7 - 7.12 \times 10^6$
$= (1.49 - 0.712) \times 10^7$
$= 0.778 \times 10^7$
$= 7.78 \times 10^{-1} \times 10^7$
$= 7.78 \times 10^6$

2. 1 jam = 60 minit

Jarak yang dilalui oleh kereta dalam masa 60 minit
= 90 km
= 90 000 m

Jarak yang dilalui oleh kereta dalam masa 100 minit
$= \dfrac{90\,000 \text{ m}}{60} \times 100$
$= 150\,000$ m
$= 1.5 \times 10^5$ m

3. $1 \text{ mm}^3 = 1 \times 10^{-3} \text{ cm}^3$
Isi padu teh tarik $= \dfrac{70}{100} \times \dfrac{22}{7} \times 50^2 \times 140$
$\qquad\qquad\qquad = 7.7 \times 10^5 \text{ mm}^3$
$\qquad\qquad\qquad = 7.7 \times 10^5 \times 10^{-3} \text{ cm}^3$
$\qquad\qquad\qquad = 7.7 \times 10^2 \text{ cm}^3$

4. $\dfrac{4}{3} \times \pi \times 14^3 = 128 \times \dfrac{1}{3} \times \pi \times j^2 \times 7$
$\qquad \dfrac{10\,976}{3} = \dfrac{896}{3} j^2$
$\qquad\quad j^2 = 12.25$
$\qquad\quad j = 3.5$ cm

Praktis Formatif: Kertas 1

1. B

$20\,\underline{1}08 \rightarrow 20\,100$
$0 < 5$

2. C

$0.7\underline{2}51 \rightarrow 0.73$ (+1)
$= 5$

3. C

$3.0\underline{4}76 \rightarrow 3.05$ (+1)
$7 > 5$

4. A

$8.0\underline{1}9 \rightarrow 8.0$
$1 < 5$

5. C

$0.40\underline{2}7 \rightarrow 0.403$ (+1)
$7 > 5$

6. C

$$95\,\underline{6}23 \to 95\,600$$

$$\uparrow$$

$$\boxed{2 < 5}$$

7. C

$$0.1354 \times 0.7 = 0.09\underline{4}78$$
$$= 0.095 \ (2 \text{ a.b.})$$

8. D

$$\overset{+1}{\frown}$$
$$0.037\underline{7}6 \to 0.0378$$
$$\uparrow$$
$$\boxed{6 < 5}$$

9. D

$$12 - 6.4 \div 50 = 11.\underline{8}72$$
$$= 11.9 \ (3 \text{ a.b.})$$

10. B

$$26\,000 = 2.6 \times 10^4$$
$$= p \times 10^q$$
$$\therefore \ p = 2.6, \ q = 4$$

11. D

$$8\,640.7 = 8.6407 \times 10^3$$

12. C

$$0.003202 = 3.202 \times 10^{-3}$$

13. D

$$59\,000 = 5.9 \times 10^4$$

14. A

$$0.00137 = 1.37 \times 10^{-3}$$

15. C

$$205 \times 10^6 = 2.05 \times 10^2 \times 10^6$$
$$= 2.05 \times 10^8$$
$$2.05 \times 10^k = 2.05 \times 10^8$$
$$\therefore \ k = 8$$

16. A

$$0.000045 = 4.5 \times 10^{-5}$$

17. D

$$\frac{28\,300}{4} = 7\,075$$
$$= 7.075 \times 10^3$$

18. B

$$4.5 \times 10^{11} + 2.8 \times 10^{12}$$
$$= 0.45 \times 10^{12} + 2.8 \times 10^{12}$$
$$= (0.45 + 2.8) \times 10^{12}$$
$$= 3.25 \times 10^{12}$$

19. D

$$6.2 \times 10^9 - 3 \times 10^8$$
$$= 6.2 \times 10^9 - 0.3 \times 10^9$$
$$= (6.2 - 0.3) \times 10^9$$
$$= 5.9 \times 10^9$$

20. D

$$0.000038 - 2.7 \times 10^{-6}$$
$$= 3.8 \times 10^{-5} - 2.7 \times 10^{-6}$$
$$= 3.8 \times 10^{-5} - 0.27 \times 10^{-5}$$
$$= (3.8 - 0.27) \times 10^{-5}$$
$$= 3.53 \times 10^{-5}$$

21. D

$$4.26 \times 10^{-8} - 1.30 \times 10^{-9}$$
$$= 4.26 \times 10^{-8} - 0.130 \times 10^{-8}$$
$$= (4.26 - 0.130) \times 10^{-8}$$
$$= 4.13 \times 10^{-8}$$

22. D

$$\frac{0.0096}{1.2 \times 10^6} = \frac{9.6 \times 10^{-3}}{1.2 \times 10^6}$$
$$= \frac{9.6}{1.2} \times 10^{-3-6}$$
$$= 8 \times 10^{-9}$$

23. A

$$\frac{10^5}{4 \times 10^{-2}} = \frac{1}{4} \times 10^{5-(-2)}$$
$$= 0.25 \times 10^7$$
$$= 2.5 \times 10^{-1} \times 10^7$$
$$= 2.5 \times 10^6$$

24. D

$$\frac{\sqrt{64 \times 10^8}}{0.002} = \frac{(8^2 \times 10^8)^{\frac{1}{2}}}{2 \times 10^{-3}}$$
$$= \frac{8 \times 10^4}{2 \times 10^{-3}}$$
$$= 4 \times 10^{4-(-3)}$$
$$= 4 \times 10^7$$

25. A

Perimeter segi empat tepat = 2.4×10^{-1} m

$$2(8 \times 10^{-2} + \text{Lebar}) = 2.4 \times 10^{-1}$$
$$8 \times 10^{-2} + \text{Lebar} = 1.2 \times 10^{-1}$$
$$\text{Lebar} = 1.2 \times 10^{-1} - 8 \times 10^{-2}$$
$$= 12 \times 10^{-2} - 8 \times 10^{-2}$$
$$= 4 \times 10^{-2}$$

26. D

2 jam = 120 minit
Jumlah isi padu air bersih
$$= 120 \times 4 \times 10^3$$
$$= 480 \times 10^3$$
$$= 4.8 \times 10^2 \times 10^3$$
$$= 4.8 \times 10^5$$

27. D

Katakan panjang tepi kubus = x cm.
$$6x^2 = 96$$
$$x^2 = 16$$
$$x = 4$$

Isi padu kubus = 4 cm × 4 cm × 4 cm
$$= 64 \text{ cm}^3$$
$$= 64 \times 10^{-6} \text{ m}^3$$
$$= 6.4 \times 10^1 \times 10^{-6} \text{ m}^3$$
$$= 6.4 \times 10^{-5} \text{ m}^3$$

28. B

$$\text{Masa} = \frac{\text{Jarak}}{\text{Laju}}$$

$$= \frac{4.5 \times 10^9 \text{ km}}{3 \times 10^8 \text{ m s}^{-1}}$$

$$= 1.5 \times 10^4 \text{ saat}$$

29. C

Separuh daripada luas lantai
$$= \frac{1}{2} \times 4 \times 10^6$$
$$= 2 \times 10^6 \text{ cm}^2$$

Bilangan jubin yang diperlukan
$$= \frac{2 \times 10^6}{2\,500}$$
$$= 800$$
$$= 8 \times 10^2$$

30. C

$$100\% - 4.5\% = 95.5\%$$

Bilangan rakyat yang berusia 65 tahun
ke bawah
$$= \frac{95.5}{100} \times 10.2 \times 10^6$$
$$= 9.741 \times 10^6$$

FOKUS KBAT

1. B

Isi padu air $= \dfrac{2}{3} \times 77$ cm × 25 cm × 120 cm
$$= 154\,000 \text{ cm}^3$$
$$\frac{22}{7} \times 35^2 \times t = 154\,000$$
$$3\,850t = 154\,000$$
$$t = 40 \text{ cm}$$
$$= 0.4 \text{ m}$$
$$= 4 \times 10^{-1} \text{ m}$$

2. C

$\times 3 \Big\langle$ 20 minit $\rightarrow 1.2 \times 10^4$ straw
60 minit (1 jam) $\rightarrow 3.6 \times 10^4$ straw $\Big\rangle \times 3$

Jumlah straw yang dihasilkan dalam masa 4 jam
$$= 4 \times 3.6 \times 10^4$$
$$= 1.44 \times 10^5$$

Bilangan peket straw yang diperoleh
$$= 1.44 \times 10^5 \div 100$$
$$= 1\,440$$
$$= 1.44 \times 10^3$$

JAWAPAN

BAB 2: UNGKAPAN DAN PERSAMAAN KUADRATIK

2.1

A

$$25 - y^2 \qquad p + 10 \qquad x^2 + y^2 - 8$$

$$\frac{1}{x^2} - x + 6 \qquad -m^2 + m + 12 \qquad \frac{1}{2}x^2 - 4$$

($25 - y^2$, $-m^2 + m + 12$, and $\frac{1}{2}x^2 - 4$ are circled)

B

1. $3x(x - 5)$
   $= 3x^2 - 15x$

2. $-p(6p - 5)$
   $= -6p^2 + 5p$

3. $-2h(4 - 5h)$
   $= -8h + 10h^2$

4. $(y + 1)(3y - 2)$
   $= 3y^2 - 2y + 3y - 2$
   $= 3y^2 + y - 2$

5. $(3 - 4x)(1 - 2x)$
   $= 3 - 6x - 4x + 8x^2$
   $= 3 - 10x + 8x^2$

6. $(2x + 5)^2$
   $= (2x + 5)(2x + 5)$
   $= 4x^2 + 10x + 10x + 25$
   $= 4x^2 + 20x + 25$

7. $(4 - 3p)^2$
   $= (4 - 3p)(4 - 3p)$
   $= 16 - 12p - 12p + 9p^2$
   $= 16 - 24p + 9p^2$

8. $(x + 3)(2x - 1) - 4x$
   $= 2x^2 - x + 6x - 3 - 4x$
   $= 2x^2 + x - 3$

9. $2(p - 3)^2$
   $= 2(p^2 - 6p + 9)$
   $= 2p^2 - 12p + 18$

10. $-5(1 - x)^2$
    $= -5(1 - 2x + x^2)$
    $= -5 + 10x - 5x^2$

11. $(2x + 1)^2 + 2x$
    $= (4x^2 + 4x + 1) + 2x$
    $= 4x^2 + 6x + 1$

12. $3y^2 - (1 - 2y)^2$
    $= 3y^2 - (1 - 4y + 4y^2)$
    $= 3y^2 - 1 + 4y - 4y^2$
    $= -1 + 4y - y^2$

2.2

A

1. $4x^2 + 16 = 4(x^2 + 4)$

2. $25 - 5x^2 = 5(5 - x^2)$

3. $x^2 + 6x = x(x + 6)$

4. $8y + 5y^2 = y(8 + 5y)$

5. $6x^2 - 10x = 2x(3x - 5)$

6. $-2x^2 - 3x = -x(2x + 3)$

7. $-9x^2 - 6x = -3x(3x + 2)$

8. $-30 - 5x^2 = -5(6 + x^2)$

B

1. $x^2 - 144 = x^2 - 12^2$
   $= (x + 12)(x - 12)$

2. $81 - y^2 = 9^2 - y^2$
   $= (9 + y)(9 - y)$

3. $49p^2 - 16 = (7p)^2 - 4^2$
   $= (7p + 4)(7p - 4)$

4. $64 - 9x^2 = 8^2 - (3x)^2$
   $= (8 + 3x)(8 - 3x)$

5. $4x^2 - 36 = 4(x^2 - 9)$
   $= 4(x^2 - 3^2)$
   $= 4(x + 3)(x - 3)$

6. $20 - 5p^2 = 5(4 - p^2)$
   $= 5(2^2 - p^2)$
   $= 5(2 + p)(2 - p)$

C

1. $x^2 + 5x + 6$
$= (x + 2)(x + 3)$

x	$+2$	$+2x$
x	$+3$	$+3x$
x^2	$+6$	$+5x$

2. $x^2 - 8x + 16$
$= (x - 4)(x - 4)$

x	-4	$-4x$
x	-4	$-4x$
x^2	$+16$	$-8x$

3. $3x^2 + x - 4$
$= (3x + 4)(x - 1)$

$3x$	$+4$	$+4x$
x	-1	$-3x$
$3x^2$	-4	$+x$

4. $2x^2 + 3x - 9$
$= (2x - 3)(x + 3)$

$2x$	-3	$-3x$
x	$+3$	$+6x$
$2x^2$	-9	$+3x$

D

1. $4x + 16x + 12$
$= 4(x^2 + 4x + 3)$
$= 4(x + 3)(x + 1)$

x	$+3$	$+3x$
x	$+1$	$+x$
x^2	$+3$	$+4x$

2. $3x^2 - 9x + 6$
$= 3(x^2 - 3x + 2)$
$= 3(x - 2)(x - 1)$

x	-2	$-2x$
x	-1	$-x$
x^2	$+2$	$-3x$

3. $4x^2 + 10x - 24$
$= 2(2x^2 + 5x - 12)$
$= 2(2x - 3)(x + 4)$

$2x$	-3	$-3x$
x	$+4$	$+8x$
$2x^2$	-12	$+5x$

4. $3x^2 - 21x + 18$
$= 3(x^2 - 7x + 6)$
$= 3(x - 6)(x - 1)$

x	-6	$-6x$
x	-1	$-x$
x^2	$+6$	$-7x$

2.3

1. $x^2 + 8 = 20 - x$
$x^2 + 8 - 20 + x = 0$
$x^2 + x - 12 = 0$

2. $x(x - 4) = x + 14$
$x^2 - 4x - x - 14 = 0$
$x^2 - 5x - 14 = 0$

3. $(x + 3)(2x - 5) = 4x$
$2x^2 - 5x + 6x - 15 - 4x = 0$
$2x^2 - 3x - 15 = 0$

4. $(3x - 1)^2 = 8$
$9x^2 - 6x + 1 - 8 = 0$
$9x^2 - 6x - 7 = 0$

5. $\dfrac{x + 1}{3} = \dfrac{2}{x}$
$x(x + 1) = 2(3)$
$x^2 + x = 6$
$x^2 + x - 6 = 0$

2.4

A

1. $x^2 + 2x - 15 = 0$; $x = 3$
Sebelah kiri $= 3^2 + 2(3) - 15$
$\qquad\qquad = 9 + 6 - 15$
$\qquad\qquad = 0$
$\qquad\qquad =$ Sebelah kanan
$\therefore x = 3$ ialah punca bagi $x^2 + 2x - 15 = 0$.

2. $x^2 - 8 = 2x$; $x = -4$

Sebelah kiri	Sebelah kanan
$= (-4)^2 - 8$	$= 2(-4)$
$= 16 - 8$	$= -8$
$= 8$	

Sebelah kiri $\neq$ Sebelah kanan
$\therefore x = -4$ bukan punca bagi $x^2 - 8 = 2x$.

3. $2x^2 = x + 3$; $x = -1$
Sebelah kiri $= 2(-1)^2$ Sebelah kanan $= -1 + 3$
$\qquad\qquad = 2$ $\qquad\qquad\qquad\qquad = 2$
Sebelah kiri $=$ Sebelah kanan
$\therefore x = -1$ ialah punca bagi $2x^2 = x + 3$.

B

1. $x(2 + 3x) = 16$
$2x + 3x^2 = 16$
$3x^2 + 2x - 16 = 0$
$(3x + 8)(x - 2) = 0$
$3x + 8 = 0$ atau $x - 2 = 0$
$x = -\dfrac{8}{3}$ $\qquad\qquad\quad x = 2$

$\therefore x = -\dfrac{8}{3}, 2$

2.
$$2(p^2 - 1) - 3 = 3p$$
$$2p^2 - 2 - 3 = 3p$$
$$2p^2 - 3p - 5 = 0$$
$$(p + 1)(2p - 5) = 0$$
$$p + 1 = 0 \quad \text{atau} \quad 2p - 5 = 0$$
$$p = -1 \qquad\qquad p = \frac{5}{2}$$
$$\therefore p = -1, \frac{5}{2}$$

3.
$$2x^2 + (3 - x)^2 = 81$$
$$2x^2 + (9 - 6x + x^2) = 81$$
$$2x^2 + 9 - 6x + x^2 - 81 = 0$$
$$3x^2 - 6x - 72 = 0$$
$$3(x^2 - 2x - 24) = 0$$
$$x^2 - 2x - 24 = 0$$
$$(x + 4)(x - 6) = 0$$
$$x + 4 = 0 \quad \text{atau} \quad x - 6 = 0$$
$$x = -4 \qquad\qquad x = 6$$
$$\therefore x = -4, 6$$

4.
$$(5x + 2)(x - 3) = 11(x - 2)$$
$$5x^2 - 15x + 2x - 6 = 11x - 22$$
$$5x^2 - 13x - 6 = 11x - 22$$
$$5x^2 - 13x - 6 - 11x + 22 = 0$$
$$5x^2 - 24x + 16 = 0$$
$$(5x - 4)(x - 4) = 0$$
$$5x - 4 = 0 \quad \text{atau} \quad x - 4 = 0$$
$$x = \frac{4}{5} \qquad\qquad x = 4$$
$$\therefore x = \frac{4}{5}, 4$$

5.
$$\frac{3x^2 - 2}{x} = 5$$
$$3x^2 - 2 = 5x$$
$$3x^2 - 5x - 2 = 0$$
$$(3x + 1)(x - 2) = 0$$
$$3x + 1 = 0 \quad \text{atau} \quad x - 2 = 0$$
$$x = -\frac{1}{3} \qquad\qquad x = 2$$
$$\therefore x = -\frac{1}{3}, 2$$

6.
$$w = \frac{8 - 7w}{w}$$
$$w^2 = 8 - 7w$$
$$w^2 + 7w - 8 = 0$$
$$(w + 8)(w - 1) = 0$$
$$w + 8 = 0 \quad \text{atau} \quad w - 1 = 0$$
$$w = -8 \qquad\qquad w = 1$$
$$\therefore w = -8, 1$$

7.
$$\frac{x - 1}{2 + x} = \frac{2}{x}$$
$$x(x - 1) = 2(2 + x)$$
$$x^2 - x = 4 + 2x$$
$$x^2 - 3x - 4 = 0$$
$$(x + 1)(x - 4) = 0$$
$$x + 1 = 0 \quad \text{atau} \quad x - 4 = 0$$
$$x = -1 \qquad\qquad x = 4$$
$$\therefore x = -1, 4$$

C

1. Katakan panjang $= (x + 4)$ cm dan lebar $= x$ cm.
$$x(x + 4) = 96$$
$$x^2 + 4x - 96 = 0$$
$$(x + 12)(x - 8) = 0$$
$$x + 12 = 0 \quad \text{atau} \quad x - 8 = 0$$
$$x = -12 \qquad\qquad x = 8$$
(Tidak mungkin)

Panjang $= 8 + 4$
$\qquad\quad = 12$ cm
Lebar $= 8$ cm

2.
$$(2x + 1)^2 - x(x) = 65$$
$$4x^2 + 4x + 1 - x^2 = 65$$
$$3x^2 + 4x - 64 = 0$$
$$(3x + 16)(x - 4) = 0$$
$$3x + 16 = 0 \quad \text{atau} \quad x - 4 = 0$$
$$x = -\frac{16}{3} \qquad\qquad x = 4$$
(Tidak mungkin)

Luas gambar yang lebih besar $= [2(4) + 1]^2$
$$= 9^2$$
$$= 81 \text{ cm}^2$$

3. Panjang bingkai gambar foto $= 15 + x + x$
$$= (15 + 2x) \text{ cm}$$

Lebar bingkai gambar foto $= 10 + x + x$
$$= (10 + 2x) \text{ cm}$$

Luas bingkai gambar foto $= 204$ cm^2
$$(15 + 2x)(10 + 2x) = 204$$
$$150 + 30x + 20x + 4x^2 = 204$$
$$4x^2 + 50x - 54 = 0$$
$$2x^2 + 25x - 27 = 0$$
$$(2x + 27)(x - 1) = 0$$
$$2x + 27 = 0 \quad \text{atau} \quad x - 1 = 0$$
$$x = -\frac{27}{2} \qquad\qquad x = 1$$
(Tidak mungkin)

$$\therefore x = 1$$

1.
$$x(4x + 11) = 3$$
$$4x^2 + 11x = 3$$
$$4x^2 + 11x - 3 = 0$$
$$(x + 3)(4x - 1) = 0$$
$$x + 3 = 0 \quad \text{atau} \quad 4x - 1 = 0$$
$$x = -3 \qquad x = \frac{1}{4}$$

$$\therefore x = -3, \frac{1}{4}$$

2.
$$(2x + 1)(x - 2) = 7$$
$$2x^2 - 4x + x - 2 = 7$$
$$2x^2 - 3x - 9 = 0$$
$$(2x + 3)(x - 3) = 0$$
$$2x + 3 = 0 \quad \text{atau} \quad x - 3 = 0$$
$$x = -\frac{3}{2} \qquad x = 3$$

$$\therefore x = -\frac{3}{2}, 3$$

3.
$$\frac{3x^2 - 12}{x} = 5$$
$$3x^2 - 12 = 5x$$
$$3x^2 - 5x - 12 = 0$$
$$(3x + 4)(x - 3) = 0$$
$$3x + 4 = 0 \quad \text{atau} \quad x - 3 = 0$$
$$x = -\frac{4}{3} \qquad x = 3$$

$$\therefore x = -\frac{4}{3}, 3$$

4.
$$\frac{x^2 + 2}{3} = x + 4$$
$$x^2 + 2 = 3x + 12$$
$$x^2 - 3x - 10 = 0$$
$$(x + 2)(x - 5) = 0$$
$$x + 2 = 0 \quad \text{atau} \quad x - 5 = 0$$
$$x = -2 \qquad x = 5$$
$$\therefore x = -2, 5$$

5.
$$(x + 5)^2 = 11x + 45$$
$$x^2 + 10x + 25 = 11x + 45$$
$$x^2 - x - 20 = 0$$
$$(x + 4)(x - 5) = 0$$
$$x + 4 = 0 \quad \text{atau} \quad x - 5 = 0$$
$$x = -4 \qquad x = 5$$
$$\therefore x = -4, 5$$

6. Apabila roket air tiba di permukaan tanah, $h = 0$.
$$0 = -2t^2 + 11t + 6$$
$$2t^2 - 11t - 6 = 0$$
$$(2t + 1)(t - 6) = 0$$
$$2t + 1 = 0 \quad \text{atau} \quad t - 6 = 0$$
$$t = -\frac{1}{2} \qquad t = 6$$
(Tidak mungkin)

Maka, roket air tiba di permukaan tanah pada masa 6 saat.

7.
$$x^2 - 20x = 3(3 - 4x)$$
$$x^2 - 20x = 9 - 12x$$
$$x^2 - 8x - 9 = 0$$
$$(x + 1)(x - 9) = 0$$
$$x + 1 = 0 \quad \text{atau} \quad x - 9 = 0$$
$$x = -1 \qquad x = 9$$
$$\therefore x = -1, 9$$

8.
$$-\frac{3}{3x - 4} = \frac{x}{9x + 10}$$
$$-3(9x + 10) = x(3x - 4)$$
$$-27x - 30 = 3x^2 - 4x$$
$$3x^2 + 23x + 30 = 0$$
$$(x + 6)(3x + 5) = 0$$
$$x + 6 = 0 \quad \text{atau} \quad 3x + 5 = 0$$
$$x = -6 \qquad x = -\frac{5}{3}$$

$$\therefore x = -6, -\frac{5}{3}$$

9.
$$(x + 4) \times x \times 50 = 24\,000$$
$$50x(x + 4) = 24\,000$$
$$50x^2 + 200x - 24\,000 = 0$$
$$x^2 + 4x - 480 = 0$$
$$(x + 24)(x - 20) = 0$$
$$x + 24 = 0 \quad \text{atau} \quad x - 20 = 0$$
$$x = -24 \qquad x = 20$$
$$\text{(Tidak mungkin)}$$
$$\therefore x = 20$$

10. Umur Mira $= p$ tahun
Umur bapa Mira $= p^2$ tahun
Umur ibu Mira $= (p^2 - 4)$ tahun
$$p + p^2 + (p^2 - 4) = 74$$
$$2p^2 + p - 78 = 0$$
$$(2p + 13)(p - 6) = 0$$
$$2p + 13 = 0 \quad \text{atau} \quad p - 6 = 0$$
$$p = -\frac{13}{2} \qquad p = 6$$

(Tidak mungkin)

$\therefore$ Umur bapa Mira $= 6^2$
$$= 36 \text{ tahun}$$

11. Luas kawasan berlorek $= 21 \text{ cm}^2$
$$8(x + 3) - x(x) - \frac{1}{2}(x + 3)(8 - x) = 21$$
$$8x + 24 - x^2 - \frac{1}{2}(8x - x^2 + 24 - 3x) = 21$$
$$8x + 24 - x^2 - \frac{1}{2}(5x - x^2 + 24) = 21$$
$$8x + 24 - x^2 - \frac{5}{2}x + \frac{x^2}{2} - 12 = 21$$
$$-\frac{x^2}{2} + \frac{11}{2}x - 9 = 0$$
$$\times (-2): \qquad x^2 - 11x + 18 = 0$$
$$(x - 2)(x - 9) = 0$$
$$x - 2 = 0 \quad \text{atau} \quad x - 9 = 0$$
$$x = 2 \qquad x = 9 \text{ (Tidak mungkin)}$$
$$\therefore x = 2$$

1.
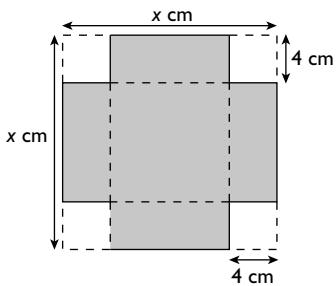
Katakan panjang sisi asal kadbod = x cm.

$$\text{Panjang sisi kotak} = x - 4 - 4$$
$$= (x - 8) \text{ cm}$$

$$(x - 8) \times (x - 8) \times 4 = 400$$
$$4(x^2 - 8x - 8x + 64) = 400$$
$$x^2 - 16x + 64 = 100$$
$$x^2 - 16x - 36 = 0$$
$$(x + 2)(x - 18) = 0$$
$$x + 2 = 0 \quad \text{atau} \quad x - 18 = 0$$
$$x = -2 \qquad\qquad x = 18$$
(Tidak mungkin)

∴ Panjang sisi asal kadbod = 18 cm

2.

$$L_A = \frac{60}{T_A}$$
$$T_A = \frac{60}{L_A} \qquad \cdots\cdots ①$$
$$L_B = L_A - 20$$
$$T_B = T_A + \frac{1}{4}$$
$$L_B = \frac{60}{T_B}$$
$$L_A - 20 = \frac{60}{T_A + \frac{1}{4}} \qquad \cdots\cdots ②$$

Gantikan ① dalam ②.

$$L_A - 20 = \frac{60}{\frac{60}{L_A} + \frac{1}{4}}$$
$$L_A - 20 = \frac{60}{\frac{240 + L_A}{4L_A}}$$

$$(L_A - 20)(240 + L_A) = 60(4L_A)$$
$$240L_A + L_A^2 - 4\,800 - 20L_A = 240L_A$$
$$L_A^2 - 20L_A - 4\,800 = 0$$
$$(L_A + 60)(L_A - 80) = 0$$
$$L_A + 60 = 0 \quad \text{atau} \quad L_A - 80 = 0$$
$$L_A = -60 \qquad\qquad L_A = 80$$
(Tidak mungkin)

∴ Laju purata kereta A ialah 80 km j^{-1}.

BAB 3: SET

3.1

A

1. (a) E $\boxed{\in}$ Q (b) M $\boxed{\in}$ Q (c) W $\boxed{\notin}$ Q

2. (a) 3 $\boxed{\in}$ R (b) 4 $\boxed{\notin}$ R (c) 18 $\boxed{\in}$ R

B

1.

P
•a •e •i
•o •u

2.

Q
•–4 •–2
•–3 •–1

3.

R
•53
•59
•61 •67
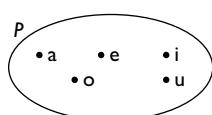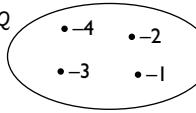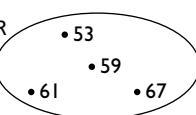
C

1. $B = \{S, H\}$
   $n(B) = 2$

2. $C = \{2, 3, 5, 7\}$
   $n(C) = 4$

3. $D = \{1, 2, 5, 10, 25, 50\}$
   $n(D) = 6$

4. $G = \{$Januari, Jun, Julai$\}$
   $n(G) = 3$

5. $H = \{21, 23, 25, 27, 29, 30, 32\}$
   $n(H) = 7$

3.2

A

1. ϕ $\boxed{\subset}$ N

2. N $\boxed{\subset}$ P

3. N $\boxed{\not\subset}$ Q

4. P $\boxed{\not\subset}$ Q

5. P $\boxed{\subset}$ R

6. Q $\boxed{\subset}$ R

B

1. $B = \{2, 4\}$
   Bilangan subset $= 2^2$
   $= 4$

2. $C = \{T, R, N, G, L\}$
   Bilangan subset $= 2^5$
   $= 32$

3. $D = \{1, 2, 5, 10\}$
   Bilangan subset $= 2^4$
   $= 16$

C

1. $P = \{3, 7\}$
   Subset bagi set $P = \{ \}, \{3\}, \{7\}, \{3, 7\}$

2. $P = \{9, 16, 25\}$
   Subset bagi set P
   $= \{ \}, \{9\}, \{16\}, \{25\}, \{9, 16\}, \{9, 25\}, \{16, 25\},$
   $\{9, 16, 25\}$

3. $P = \{2, 3, 5, 7\}$
   Subset bagi set P
   $= \{ \}, \{2\}, \{3\}, \{5\}, \{7\}, \{2, 3\}, \{2, 5\}, \{2, 7\},$
   $\{3, 5\}, \{3, 7\}, \{5, 7\}, \{2, 3, 5\}, \{2, 3, 7\},$
   $\{2, 5, 7\}, \{3, 5, 7\}, \{2, 3, 5, 7\}$

4. $P = \{A, O, E\}$
   Subset bagi set P
   $= \{ \}, \{A\}, \{O\}, \{E\}, \{A, O\}, \{A, E\},$
   $\{O, E\}, \{A, O, E\}$

5. $P = \{2, 4, 6, 8\}$
   Subset bagi set P
   $= \{ \}, \{2\}, \{4\}, \{6\}, \{8\}, \{2, 4\}, \{2, 6\}, \{2, 8\},$
   $\{4, 6\}, \{4, 8\}, \{6, 8\}, \{2, 4, 6\}, \{2, 4, 8\},$
   $\{2, 6, 8\}, \{4, 6, 8\}, \{2, 4, 6, 8\}$

D

1.

ξ
P
•3 •9
•15
•6 •12
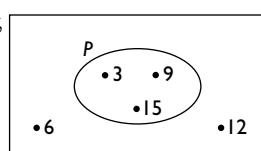
2. $\xi = \{8, 16, 24, 32, 40, 48\}$
   $Q = \{16, 32\}$

ξ
Q
•16
•32
•8 •24 •40 •48
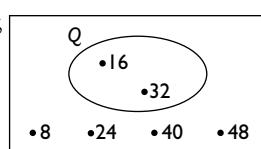
3. ξ = {f, a, m, i, l, y}
T = {m, a, i, l}
U = {a, i}

E
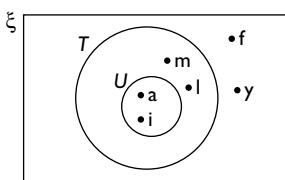
1. ξ = {t, e, r, a, n, g}
P = {t, r, n, g}
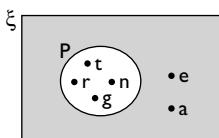
P' = {e, a}

2.
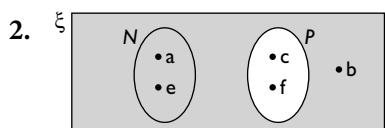
P' = {a, b, e}

3.

P' = {1, 3, 7, 9}

4.
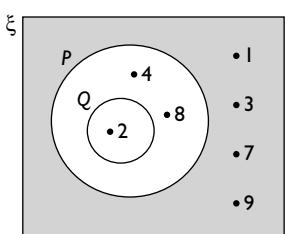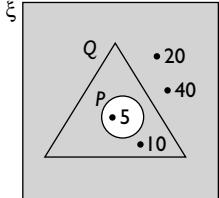
P' = {10, 20, 40}

5. ξ = {11, 13, 17, 19}
P = {11, 17}
P' = {13, 19}

**6.** ξ = {1, 2, 3, 4, 6, 12}
P = {1, 2, 4}
P' = {3, 6, 12}

3.3

A

1. (a) $X \cap Y$ = {a, g, e}
(b) $X \cap Z$ = {b, e}
(c) $Y \cap Z$ = {e, f}
(d) $X \cap Y \cap Z$ = {e}

2. (a) $A \cap B$ = {13}
(b) $B \cap C$ = {13, 16}
(c) $A \cap C$ = {11, 13}
(d) $A \cap B \cap C$ = {13}

B

1. (a) $J \cap K$ = {a, i}
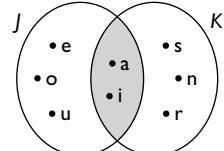
(b) $J \cap K \cap L$ = {a}
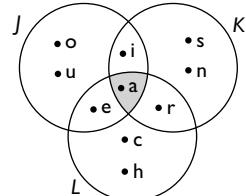
2. R = {2, 3, 5, 7, 11, 13, 17, 19}
S = {3, 5, 7, 9, 11, 13, 15}
T = {0, 1, 2, 3, 4, 5, 6, 7 8, 9}

(a) $R \cap S$ = {3, 5, 7, 11, 13}
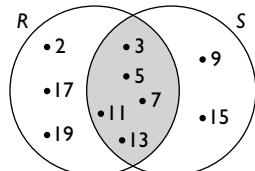
(b) $R \cap S \cap T$ = {3, 5, 7}
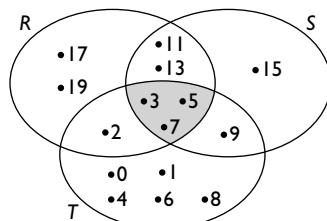
C

1.
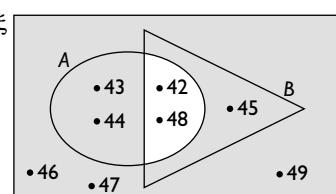
$(A \cap B)'$ = {43, 44, 45, 46, 47, 49}

2.
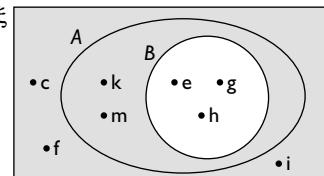
$(A \cap B)'$ = {c, f, i, k, m}

3.
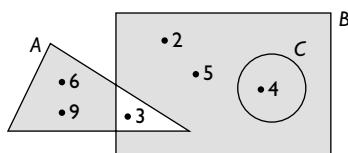
$(A \cap B)' = \{2, 4, 5, 6, 9\}$

D

1. $\xi = \{k, o, m, p, u, t, e, r\}$
$P = \{t, e, p, u\}$
$Q = \{p, e, r, u, t\}$
$P \cap Q = \{t, e, p, u\}$
$(P \cap Q)' = \{k, o, m, r\}$

2. $\xi = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$
$P = \{4, 6, 9, 12\}$
$Q = \{5, 6, 8, 9, 12, 13\}$
$P \cap Q = \{6, 9, 12\}$
$(P \cap Q)' = \{4, 5, 7, 8, 10, 11, 13, 14\}$

3. $\xi = \{24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36\}$
$P = \{25, 30, 35\}$
$Q = \{25, 36\}$
$P \cap Q = \{25\}$
$(P \cap Q)' = \{24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36\}$

E

1. (a) $20 + 28 + 7 + 5 = 60$
(b) $52 + 20 + 30 = 102$
(c) 5

2. (a) $3p + p = 232$
$4p = 232$
$p = 58$

(b) $3(58) + 17 = 174 + 17$
$= 191$

F

1. (a) $P \cup R = \{a, e, n, s, t, u\}$
(b) $Q \cup R = \{a, d, e, h, n, t, u\}$
(c) $P \cup Q \cup R = \{a, d, e, h, n, s, t, u\}$

2. (a) $X \cup Y = \{2, 4, 5, 7, 8, 10\}$
(b) $Y \cup Z = \{4, 5, 10, 13, 15\}$
(c) $X \cup Y \cup Z = \{2, 4, 5, 7, 8, 10, 13, 15\}$

G

1. $A = \{2, 3, 4, 5\}$
$B = \{1, 3, 5, 7\}$
$A \cup B = \{1, 2, 3, 4, 5, 7\}$

2. $M = \{b, e, s, t\}$
$N = \{t, e, a, c, h, e, r\}$
$M \cup N = \{b, s, t, e, a, c, h, e, r\}$

3. $P = \{E, A\}$
$Q = \{U, A\}$
$P \cup Q = \{A, E, U\}$

4. $S = \{2, 3, 5, 7\}$
$T = \{1, 3, 5, 7, 9\}$
$S \cup T = \{1, 2, 3, 5, 7, 9\}$

5. $J = \{40, 42, 44, 46, 48, 50\}$
$K = \{49\}$
$L = \{40, 45, 50\}$
$J \cup K \cup L = \{40, 42, 44, 45, 46, 48, 49, 50\}$

H

1.
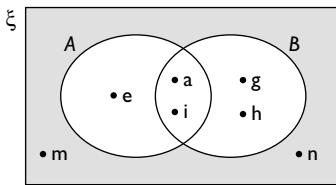
$(A \cup B)' = \{m, n\}$

2.
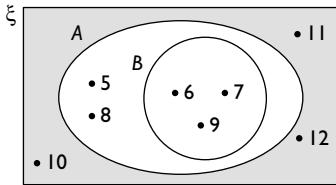
$(A \cup B)' = \{10, 11, 12\}$

3.
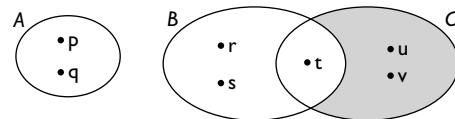
$(A \cup B)' = \{u, v\}$

I

1. $\xi = \{K, H, I, D, M, A, T\}$
$P = \{H, A, T, I\}$
$Q = \{D, A, H, I\}$
$P \cup Q = \{A, D, H, I, T\}$

$(P \cup Q)' = \{K, M\}$

2. $\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
$P = \{2, 4, 6, 8\}$
$Q = \{2, 3, 5, 7\}$
$P \cup Q = \{2, 3, 4, 5, 6, 7, 8\}$

$(P \cup Q)' = \{1, 9\}$

3. $\xi = \{20, 21, 22, 23, 24, 25\}$
$P = \{21, 23, 25\}$
$Q = \{21, 23\}$
$P \cup Q = \{21, 23, 25\}$

$(P \cup Q)' = \{20, 22, 24\}$

J

1. (a) $n(K \cap M) = 125 - 80$
$\qquad\qquad\qquad = 45$

$\qquad n(M) = 45 + 65$
$\qquad\qquad\quad = 110$

(b) $n(K \cup M)' = 50$

2. (a) $n(K \cup S) = 7 + 1 + 6 + 3 + 2 + 8$
$\qquad\qquad\qquad = 27$

(b) $n(K \cup P \cup S)' = 9$

K

1. (a) P'
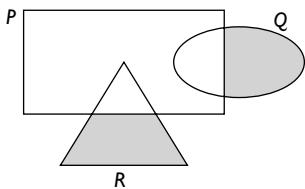
(b) $P \cap Q'$
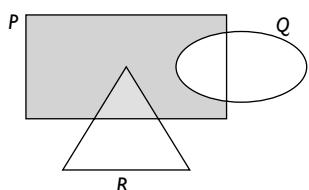
(c) $(P' \cap R) \cup Q$
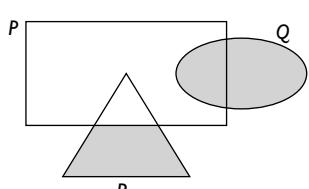
**2.** (a) $P \cap Q$
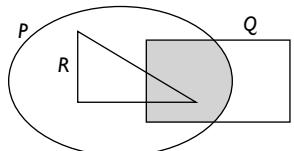
(b) $Q' \cap R$
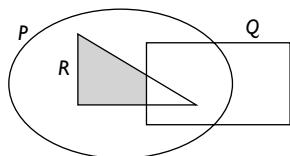
(c) $(P \cap Q) \cup R$
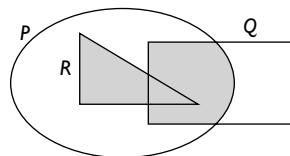

3. (a) $X \cap Z'$
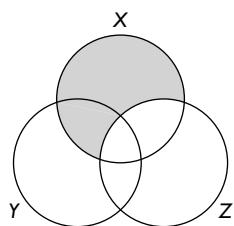

(b) $(X \cup Y) \cap Z$
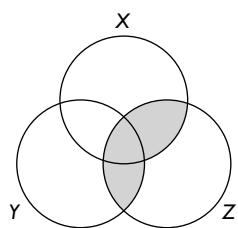
(c) $X \cap Y' \cap Z$
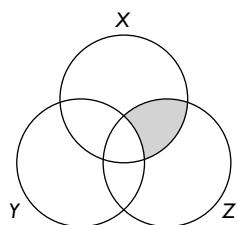
4. (a) $X' \cap Y$
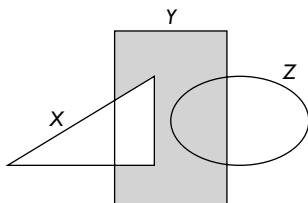
(b) $X \cup (Y \cap Z)$
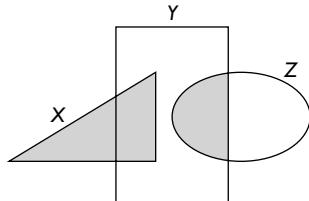
(c) $(X \cap Y)' \cup Z$
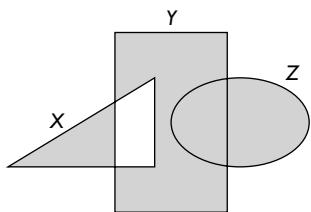
L

1. (a) $P \cap R' = \{2, 3, 5, 6\}$
   (b) $P \cap Q \cup R = \{5, 6, 7, 8\}$

2. (a) $n(J \cap K) = 3 + 4$
   $\qquad\qquad = 7$
   (b) $n(J \cup K \cap L') = 2 + 3 + 2$
   $\qquad\qquad\qquad = 7$

3. (a) $Q = \{24, 25, 34, 35\}$

   (b) $P = \{21, 24, 27, 30, 33\}$
   $R = \{21, 23, 25, 27, 29, 31, 33, 35\}$
   $P \cup Q = \{21, 24, 25, 27, 30, 33, 34, 35\}$
   $P \cup Q \cap R = \{21, 25, 27, 33, 35\}$
   $\therefore n(P \cup Q \cap R) = 5$

4. (a) $\xi = \{e, t, i, k, a, m, o, r, l, s, p\}$
   $\qquad \therefore n(\xi) = 11$

   (b) $X \cap Z = \{i, k, a\}$
   $Y = \{m, o, r, a, l\}$
   $\therefore (X \cap Z) \cup Y = \{a, i, k, l, m, o, r\}$

   (c) $X \cup Y = \{e, t, i, k, a, m, o, r, l\}$
   $(X \cup Y)' = \{s, p\}$
 $\therefore n(X \cup Y)' = 2$

Praktis Formatif: Kertas 1

1. **D**

   $n(K) = 2$
   Bilangan subset bagi set $K = 2^2$
   $\qquad\qquad\qquad\qquad = 4$

   Subset bagi set $K = \{\star\}, \{\bigcirc\}, \{\star, \bigcirc\}, \{\ \}$

2. **D**

   $X = \{m, n\}$

   Subset bagi set $X = \{\ \}, \{m\}, \{n\}, \{m, n\}$

3. **B**

   $E = \{2, 3, 4, 5\}$
   $G = \{2, 5\}$
   $G' = \{3, 4\}$

4. **A**
   $$n(\xi) = 24$$
   $$x + 5 + 3 + 1 + 7 = 24$$
   $$x + 16 = 24$$
   $$x = 8$$
   $n(K') = x + 7$
   $\qquad\quad = 8 + 7$
   $\qquad\quad = 15$

5. **B**

   $X' = \{c, d, h\}$

6. **C**
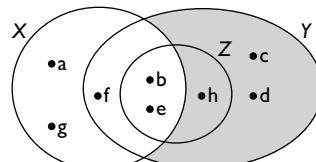
   $\xi = \{1, 3, 5, 7, 9, 11, 13\}$
   $P = \{11, 13\}$
   $Q = \{7, 9, 11, 13\}$
   $Q \cap R = \{7\}$

   $R' = \{9, 11, 13\}$

7. **B**
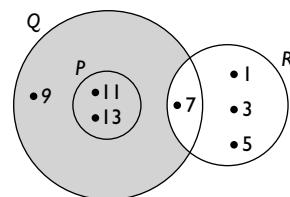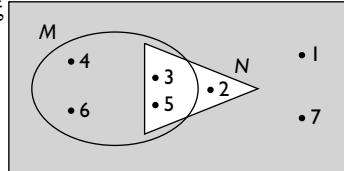
   $N' = \{1, 4, 6, 7\}$

8. **D**

   $\xi = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
   $P = \{22, 24, 26, 28\}$
   $P' = \{21, 23, 25, 27, 29, 30\}$

9. **C**

   $P = \{12, 16, 20, 24, 28, 32, 36, 40, 44, 48\}$
   $Q = \{16, 24, 32, 40, 48\}$
   $Q \subset P$
   $(P \cap Q) = Q$

10. **B**

    $L = \{5, 10\}$
    $M = \{1, 2\}$
    $L \cup M = \{1, 2, 5, 10\}$
 $n(L \cup M) = 4$
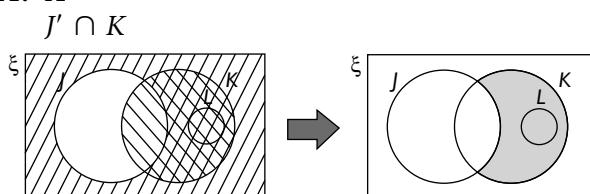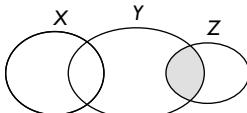
11. A

$J' \cap K$

12. C

$X \cap Z = \{a, d\}$
$Y = \{p, q, r, s\}$
$Y \cup (X \cap Z) = \{a, d, p, q, r, s\}$

13. D

$P \cap Q$ dan $Q \cap R = \phi$

14. B

$X \cap Y \cup Z$

15. C

$P \cap Q' \cap R$

16. C

$P \cup (Q \cap R)$

17. B

A $(Y \cup Z)' \cap X$

B $(Y \cup Z)' \cap X' = \phi$

C $(Y \cap Z)' \cap X$

D $(Y \cap Z) \cap X'$

18. C

$(P \cap Q)' \cap R$

19. D
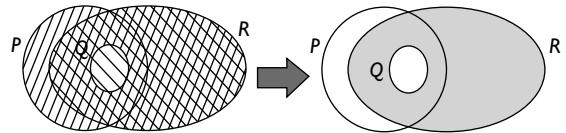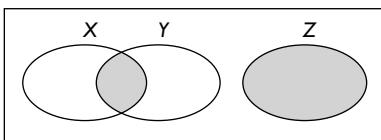
$$n(X) = n(Y \cup Z)'$$
$$p + 5\ p + 1 = p + 3p$$
$$2p + 6 = 4p$$
$$2p = 6$$
$$p = 3$$

$$n(\xi) = p + 5 + p + 1 + 8 + 3p$$
$$= 5p + 14$$
$$= 5(3) + 14$$
$$= 15 + 14$$
$$= 29$$

20. C
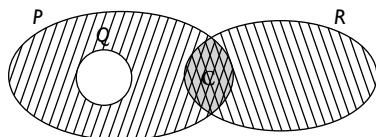
$$n(P \cup Q) = n(R)$$
$$2 + x + 8 + 4 = 4 + 2 + 3x$$
$$14 + x = 6 + 3x$$
$$2x = 8$$
$$x = 4$$

21. D
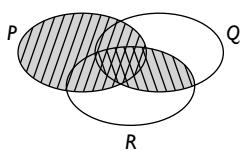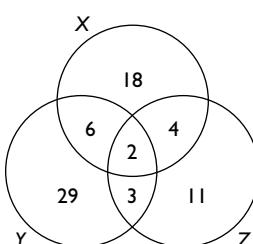
$Z : 20\% - 2\% - 3\% - 4\% = 11\%$

$11\% \times 12\ 000 = \dfrac{11}{100} \times 12\ 000$
$$= 1\ 320$$
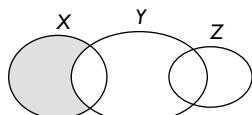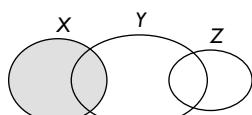
22. C
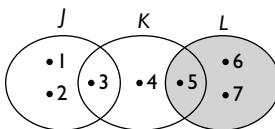
$J' \cap L = \{5, 6, 7\}$

23. C
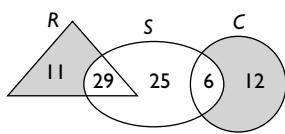
$n(S') = 11 + 12$
$\qquad = 23$

24. B

Bilangan murid yang menyertai Kelas Catur
$= \dfrac{1}{5} \times$ Bilangan murid yang menyertai
Kelab Interact
$$x + 10 = \frac{1}{5} \times (25 + 45 + x)$$
$$5(x + 10) = 70 + x$$
$$5x + 50 = 70 + x$$
$$4x = 20$$
$$x = 5$$

Bilangan murid yang menyertai Kelab Seni
sahaja
$= 6x$
$= 6(5)$
$= 30$

25. C

$6 + x = 10$
$\qquad x = 4$

Bilangan murid yang menyertai satu kelab
sahaja
$= 10 + 2(4) + 4$
$= 10 + 8 + 4$
$= 22$

26. B

$$(15 - x) + (10 - x) = 13$$
$$25 - 2x = 13$$
$$2x = 12$$
$$x = 6$$

Jumlah pekerja $= (15 - x) + x + (10 - x)$
$\qquad\qquad\qquad = 25 - x$
$\qquad\qquad\qquad = 25 - 6$
$\qquad\qquad\qquad = 19$

Praktis Formatif: Kertas 2

1. (a) $P \cap Q$
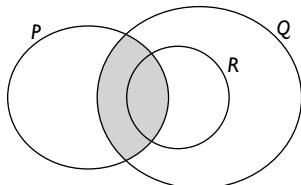
(b) $Q' \cup R$
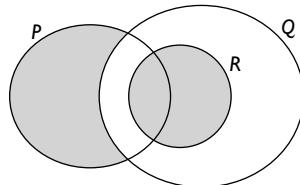
2. (a) $K \cup L$
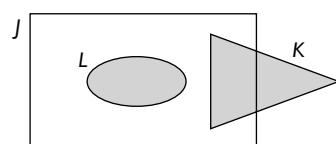
(b) $(J \cap K) \cup L$
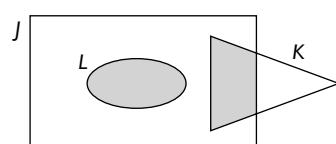
3. (a) $Y \cap Z'$
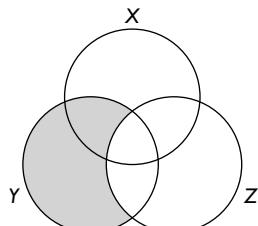
(b) $(X' \cap Y) \cup Z$
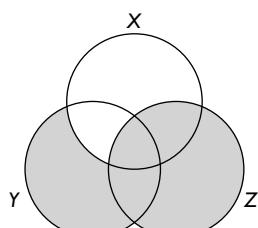
4. (a) $X \cap Y$
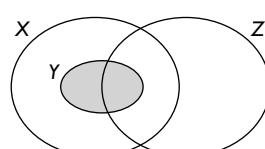
(b) $X \cap (Y \cup Z)'$
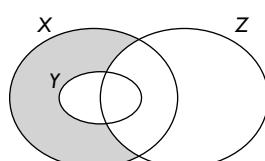
5. (a) N'
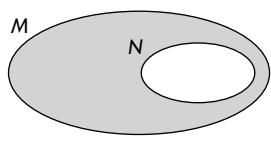
(b) $(J \cup L) \cap K$
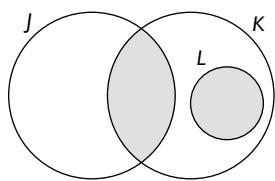
6. (a) $J \cap K$
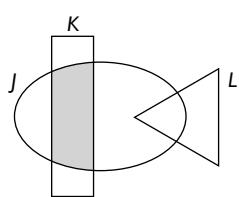
(b) $J \cap (K \cup L')$
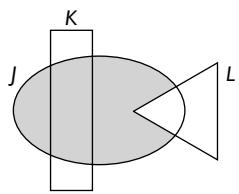
7. (a) C'
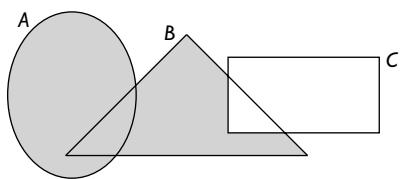
(b) $(A \cap B) \cup C$
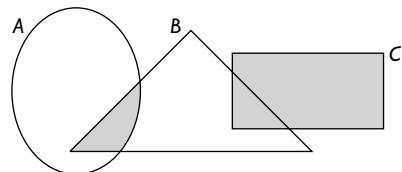
8. (a)
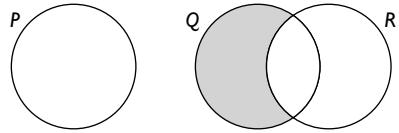
Set $Q \cap R'$ atau set $(P \cup R)'$ atau setara

(b)
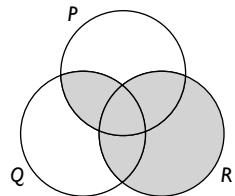
Set $(P \cap Q) \cup R$ atau setara
(Terima jawapan lain yang munasabah)

BAB 4: PENAAKULAN MATEMATIK

4.1

Ayat *Sentence*	'Pernyataan' atau 'Bukan pernyataan' *'Statement' or 'Not a statement'*	Benar atau Palsu *True or False*
1. $5 \text{ cm} = 0.05 \text{ m}$	Pernyataan *Statement*	Benar *True*
2. $x^2 = 81$	Bukan pernyataan *Not a statement*	–
3. $\frac{6}{5}$ ialah pecahan tak wajar. $\frac{6}{5}$ *is an improper fraction.*	Pernyataan *Statement*	Benar *True*
4. Adakah 2 satu nombor perdana? *Is 2 a prime number?*	Bukan pernyataan *Not a statement*	–
5. 88 ialah kuasa dua sempurna. *88 is a perfect square.*	Pernyataan *Statement*	Palsu *False*
6. $9 \times 0 \neq 9 + 0$	Pernyataan *Statement*	Benar *True*
7. $a^2 - b^2 = (a + b)(a - b)$	Pernyataan *Statement*	Benar *True*
8. Sebuah heksagon mempunyai lima sisi. *A hexagon has five sides.*	Pernyataan *Statement*	Palsu *False*
9. $(-4)^2 > 10$	Pernyataan *Statement*	Benar *True*
10. $P = \{a, b, c, d, e\}$	Bukan pernyataan *Not a statement*	–

4.2

A

1. Semua
All

2. Sebilangan
Some

3. Semua
All

4. Sebilangan
Some

5. Semua
All

6. Sebilangan
Some

B

1. Benar
True

2. Palsu
False

3. Palsu
False

4. Benar
True

5. Benar
True

6. Palsu
False

		Pernyataan *Statement*	Benar atau Palsu *True or False*
1.	*p*	Semua nombor dengan digit terakhir 0 atau 5 ialah gandaan 5. *All numbers end with either 0 or 5 are multiples of 5.*	Benar *True*
	~p	..........Bukan.......... semua nombor dengan digit terakhir 0 atau 5 ialah gandaan 5. ....*Not*.......... all numbers end with either 0 or 5 are multiples of 5.	Palsu *False*
2.	*p*	$\sqrt{81}$ bersamaan dengan 9. $\sqrt{81}$ *is equal to 9.*	Benar *True*
	~p	$\sqrt{81}$ ....tidak.......... bersamaan dengan 9. $\sqrt{81}$ *is* ....*not*.......... *equal to 9.*	Palsu *False*
3.	*p*	6 ialah faktor bagi 20. *6 is a factor of 20.*	Palsu *False*
	~p	6 ....bukan.......... faktor bagi 20. 6 *is* ....*not*.......... *a factor of 20.*	Benar *True*
4.	*p*	Hasil tambah sudut peluaran bagi sebarang poligon ialah 360°. *The sum of exterior angles of any polygon is 360°.*	Benar *True*
	~p	Hasil tambah sudut peluaran bagi sebarang poligon ....bukan.......... 360°. *The sum of the exterior angles of any polygon is* ....*not*.......... *360°.*	Palsu *False*
5.	*p*	$x(x-3)$ ialah satu ungkapan linear. $x(x-3)$ *is a linear expression.*	Palsu *False*
	~p	$x(x-3)$ ....bukan.......... satu ungkapan linear. $x(x-3)$ *is* ....*not*.......... *a linear expression.*	Benar *True*
6.	*p*	$\frac{9}{12}$ adalah setara dengan $\frac{3}{4}$. $\frac{9}{12}$ *is equivalent to* $\frac{3}{4}$.	Benar *True*
	~p	$\frac{9}{12}$ tidak setara dengan $\frac{3}{4}$. $\frac{9}{12}$ *is not equivalent to* $\frac{3}{4}$.	Palsu *False*
7.	*p*	Semua gandaan 15 ialah gandaan 30. *All multiples of 15 are multiples of 30.*	Palsu *False*
	~p	Bukan semua gandaan 15 ialah gandaan 30. *Not all multiples of 15 are multiples of 30.*	Benar *True*

B

Pernyataan majmuk *Compound statement*	Benar atau Palsu *True or False*
1. $\boxed{7^0 = 7}$ dan/*and* $\boxed{(-6) \times (-9) = 54}$. (Palsu *False*) dan/*and* (Benar *True*)	Palsu *False*
2. 65% = 0.65 dan/*and* $\frac{1}{4} = \frac{3}{12}$. (Benar *True*) dan/*and* (Benar *True*)	Benar *True*
3. 3 bukan faktor bagi 51 dan $10^{-4} = 0.001$. *3 is not a factor of 51 and $10^{-4} = 0.001$.* (Palsu *False*) dan/*and* (Palsu *False*)	Palsu *False*
4. $\sqrt{\frac{25}{64}} = \frac{5}{8}$ dan $\frac{5}{8}$ ialah pecahan tak wajar. $\sqrt{\frac{25}{64}} = \frac{5}{8}$ *and* $\frac{5}{8}$ *is an improper fraction.* (Benar *True*) dan/*and* (Palsu *False*)	Palsu *False*

C

Pernyataan majmuk *Compound statement*	Benar atau Palsu *True or False*
1. $\boxed{3a + 5a = 8a^2}$ atau/*or* $\boxed{y(y - 3) = y^2 - 3y}$. (Palsu *False*) atau/*or* (Benar *True*)	Benar *True*
2. 135° bukan sudut tirus atau 23 – (–17) = 40. *135° is not an acute angle or 23 – (–17) = 40.* (Benar *True*) atau/*or* (Benar *True*)	Benar *True*
3. { } ⊂ {p, q, r, s} atau/*or* –0.37 < –1.4. (Benar *True*) atau/*or* (Palsu *False*)	Benar *True*
4. Sebuah kubus mempunyai 8 muka atau $\frac{3}{4} \neq 0.75$. *A cube has 8 faces or $\frac{3}{4} \neq 0.75$.* (Palsu *False*) atau/*or* (Palsu *False*)	Palsu *False*

D

1. 9 ÷ 3 = 3 .... atau/*or* .... 9 – 3 = 3.

(Benar *True*)   (Palsu *False*)

2. $\frac{1}{4} = \frac{4}{8}$ .... atau/*or* .... $\sqrt[3]{27} = 3$.

(Palsu *False*)   (Benar *True*)

3. $2^{-1} = \frac{1}{2}$ 'dan' atau 'atau'
       'and' or 'or' .... –1 × (–8) = 8.

(Benar *True*)   (Benar *True*)

4. $2^0 = 1$ .... atau/*or* .... $\sqrt{49} = 7^2$.

(Benar *True*)   (Palsu *False*)

5. 10 ialah nombor ganjil .... atau .... –5 < –3.
10 is an odd number .... *or* .... *–5 < –3.*

(Palsu *False*)   (Benar *True*)

6. $3^2 + 1 = 10$ .... atau .... 15 ialah nombor perdana.

$3^2 + 1 = 10$ .... or .... 15 is a prime number.

(Benar / True)   (Palsu / False)

7. 63 ialah gandaan 9 .... 'dan' atau 'atau' .... 0.08 kurang daripada 0.1.

63 is a multiple of 9 .... 'and' or 'or' .... 0.08 is less than 0.1.

(Benar / True)   (Benar / True)

8. 44 ialah kuasa dua sempurna .... atau .... {2, 3} mempunyai 4 subset.

44 is a perfect square .... or .... {2, 3} has 4 subsets.

(Palsu / False)   (Benar / True)

4.4

A

Implikasi *Implication*	Antejadian *Antecedent*	Akibat *Consequent*
1. Jika $xy = 0$, maka $x = 0$ atau $y = 0$. *If xy = 0, then x = 0 or y = 0.*	$xy = 0$	$x = 0$ atau $y = 0$. *x = 0 or y = 0.*
2. Jika $2 : 5 = m : 15$, maka $m = 6$. *If 2 : 5 = m : 15, then m = 6.*	$2 : 5 = m : 15$	$m = 6$
3. Jika set A mempunyai 8 subset, maka $n(A) = 3$. *If set A has 8 subsets, then n(A) = 3.*	Set A mempunyai 8 subset. *Set A has 8 subsets.*	$n(A) = 3$
4. Jika p ialah nombor genap, maka p boleh dibahagi tepat dengan 2. *If p is an even number, then p is divisible by 2.*	p ialah nombor genap. *p is an even number.*	p boleh dibahagi tepat dengan 2. *p is divisible by 2.*

B

1. Implikasi 1/*Implication 1*: Jika $x + 1 > 8$, maka $x > 7$.
If x + 1 > 8, then x > 7.

Implikasi 2/*Implication 2*: Jika $x > 7$, maka $x + 1 > 8$.
If x > 7, then x + 1 > 8.

2. Implikasi 1/*Implication 1*: Jika $\sqrt[3]{m} = 4$, maka $m = 64$.
If $\sqrt[3]{m}$ = 4, then m = 64.

Implikasi 2/*Implication 2*: Jika $m = 64$, maka $\sqrt[3]{m} = 4$.
If m = 64, then $\sqrt[3]{m}$ = 4.

3. Implikasi 1/*Implication 1*: Jika y ialah gandaan 9, maka y boleh dibahagi tepat dengan 9.
If y is a multiple of 9, then y is divisible by 9.

Implikasi 2/*Implication 2*: Jika y boleh dibahagi tepat dengan 9, maka y ialah gandaan 9.
If y is divisible by 9, then y is a multiple of 9.

4. Implikasi 1/*Implication 1*: Jika $ax^2 + bx + c$ ialah ungkapan kuadratik, maka $a \neq 0$.
If ax² + bx + c is a quadratic expression, then a ≠ 0.

Implikasi 2/*Implication 2*: Jika $a \neq 0$, maka $ax^2 + bx + c$ ialah ungkapan kuadratik.
If a ≠ 0, then ax² + bx + c is a quadratic expression.

5. Implikasi 1/*Implication 1*: Jika set *A* ialah set kosong, maka set *A* tidak mempunyai unsur.
If set A is an empty set, then set A has no elements.

Implikasi 2/*Implication 2*: Jika set *A* tidak mempunyai unsur, maka set *A* ialah set kosong.
If set A has no elements, then set A is an empty set.

6. Implikasi 1/*Implication 1*: Jika $S \subset T$, maka $S \cup T = T$.
If $S \subset T$, then $S \cup T = T$.

Implikasi 2/*Implication 2*: Jika $S \cup T = T$, maka $S \subset T$.
If $S \cup T = T$, then $S \subset T$.

C

Implikasi *Implication*	Akas *Converse*	Benar atau Palsu *True or False*
1. Jika $a \geq b$, maka $\frac{a}{b}$ ialah pecahan tak wajar. *If $a \geq b$, then $\frac{a}{b}$ is an improper fraction.*	Jika $\frac{a}{b}$ ialah pecahan tak wajar, maka $a \geq b$. *If $\frac{a}{b}$ is an improper fraction, then $a \geq b$.*	Benar *True*
2. Jika $x = 25$, maka $\sqrt{x} = 5$. *If $x = 25$, then $\sqrt{x} = 5$.*	Jika $\sqrt{x} = 5$, maka $x = 25$. *If $\sqrt{x} = 5$, then $x = 25$.*	Benar *True*
3. Jika *m* ialah gandaan 6, maka *m* ialah gandaan 3. *If m is a multiple of 6, then m is a multiple of 3.*	Jika *m* ialah gandaan 3, maka *m* ialah gandaan 6. *If m is a multiple of 3, then m is a multiple of 6.*	Palsu *False*
4. Jika $n > 5$, maka $n > 3$. *If $n > 5$, then $n > 3$.*	Jika $n > 3$, maka $n > 5$. *If $n > 3$, then $n > 5$.*	Palsu *False*
5. Jika *x* ialah nombor ganjil, maka $2x$ ialah nombor genap. *If x is an odd number, then 2x is an even number.*	Jika $2x$ ialah nombor genap, maka *x* ialah nombor ganjil. *If 2x is an even number, then x is an odd number.*	Palsu *False*
6. Jika sebuah poligon sekata mempunyai 8 sisi, maka sudut pedalaman poligon sekata itu ialah 135°. *If a regular polygon has 8 sides, then the interior angle of the regular polygon is 135°.*	Jika sudut pedalaman sebuah poligon sekata ialah 135°, maka poligon sekata itu mempunyai 8 sisi. *If the interior angle of a regular polygon is 135°, then the regular polygon has 8 sides.*	Benar *True*

4.5

A

1. 31 mempunyai dua faktor sahaja.
31 has only two factors.

2. Pepejal *B* mempunyai dua muka bertentangan yang selari dan kongruen.
Solid B has two opposite faces which are parallel and congruent.

3. *STUVW* mempunyai sisi dan sudut pedalaman yang sama.
STUVW has equal sides and equal interior angles.

4. *ABCD* ialah sebuah trapezium.
ABCD is a trapezium.

5. 54 ialah gandaan 2.
54 is a multiple of 2.

B

1. $x^2 - 8x = 0$

2. 24 ialah nombor genap.
24 is an even number.

3. Jika $A \subset B$, maka $A \cap B = A$.
If $A \subset B$, then $A \cap B = A$.

4. Poligon *Q* ialah sebuah pentagon.
Polygon Q is a pentagon.

5. Set *A* mempunyai 2^4 (16) subset.
Set A has 2^4 (16) subsets.

C

1. $y + 4 \neq 10$

2. 59 bukan gandaan 10.
   59 is not a multiple of 10.

3. $n \neq 2$

4. x bukan faktor bagi 36.
   x is not a factor of 36.

5. Lilitan bulatan P bukan 44 cm.
   The circumference of circle P is not 44 cm.

D

1. *STUV* mempunyai 4 sisi yang sama panjang.
   (Bentuk I)
   STUV has 4 sides of equal length.
   (Form I)

2. $n \neq 0$
   (Bentuk III)
   (Form III)

3. 15 tidak boleh dibahagi tepat dengan 2.
   (Bentuk II)
   15 is not divisible by 2.
   (Form II)

4. Panjang sisi segi empat sama *PQRS* bukan 4 cm.
   (Bentuk III)
   The length of side of square PQRS is not 4 cm.
   (Form III)

5. 37 ialah nombor perdana.
   (Bentuk I)
   37 is a prime number.
   (Form I)

6. *AB* bersilang dengan *XY*.
   (Bentuk II)
   AB intersects XY.
   (Form II)

4.6

A

1. $a° + b° + c° = 180°$

2. −12 kurang daripada sifar.
   −12 is less than zero.

3. *PQRS* mempunyai pepenjuru yang sama panjang.
   PQRS has diagonals of equal length.

B

1. $n^2 + 2$, $n = 0, 1, 2, 3, …$

2. $7n − 1$, $n = 1, 2, 3, 4, …$

3. $5 − n^2$, $n = 1, 2, 3, 4, …$

4. $10 − 4n$, $n = 0, 1, 2, 3, …$

5. $2^n + n$, $n = 1, 2, 3, 4, …$

Praktis Formatif: Kertas 2

1. (a) Benar
   True

   (b) $\sqrt{6}$ = 3 atau 2 ialah nombor perdana.
   $\sqrt{6}$ = 3 or 2 is a prime number.

   (c) $x = 4$

2. (a) Implikasi 1: Jika $x − 5 > 8$, maka $x > 13$.
   Implikasi 2: Jika $x > 13$, maka $x − 5 > 8$.
   Implication 1: If x − 5 > 8, then x > 13.
   Implication 2: If x > 13, then x − 5 > 8.

   (b) $\sqrt{x} \neq 4$

   (c) $5 + 2^n$, $n = 1, 2, 3, 4, …$

3. (a) (i) ......Sebilangan...... nombor genap ialah kuasa dua sempurna.
   ......*Some*...... *even numbers are perfect squares.*

   (ii) ......Semua...... kubus mempunya 6 muka segi empat sama.
   ......*All*...... *cubes have 6 square faces.*

   (b) Akas: Jika $x < −6$, maka $x < −12$.
   Akas itu adalah palsu.
   Converse: If x < −6, then x < −12.
   The converse is false.

   (c) $x \neq −2$

4. (a) Akas: Jika $m < 2$, maka $m < 5$.
   Akas itu adalah palsu.
   Converse: If m < 2, then m < 5.
   The converse is false.

   (b) Premis 2: $y = x + 4$ ialah persamaan linear.
   Premise 2: y = x + 4 is a linear equation.

   (c) Luas permukaan sfera
   Surface area of the sphere
   $= 4 \times \pi \times 7^2$
   $= 196\pi$ cm^2

5. (a) (i) Palsu
   False

   (ii) Akas: Jika $x^3 = 125$, maka $x = 5$.
   Converse: If x³ = 125, then x = 5.

   (b) $2 \in \{0, 2, 4, 6\}$ ......atau/*or*...... $(2 \times 3)^0 = 6$

   (c) m dan n ialah nombor ganjil.
   m and n are odd numbers.

   (d) $8n + 2$, $n = 0, 1, 2, 3, …$

6. (a) Bukan pernyataan
Not a statement

(b) Implikasi 1:
Jika perimeter pentagon sekata *PQRST* ialah 30 cm, maka sisi pentagon sekata *PQRST* ialah 6 cm.
Implikasi 2:
Jika sisi pentagon sekata *PQRST* ialah 6 cm, maka perimeter pentagon sekata *PQRST* ialah 30 cm.
Implication 1:
If the perimeter of regular pentagon PQRST is 30 cm, then the side of regular pentagon PQRST is 6 cm.
Implication 2:
If the side of regular pentagon PQRST is 6 cm, then the perimeter of regular pentagon PQRST is 30 cm.

(c) Segi tiga *PQR* ialah segi tiga bersudut tegak.
Triangle PQR is a right-angled triangle.

(d) Hasil tambah sudut pedalaman bagi sebuah heksagon
Sum of the interior angle of a hexagon
$= (6 - 2) \times 180°$
$= 720°$

7. (a) (i) Pernyataan benar
True statement

(ii) Pernyataan palsu
False statement

(b) (i) Didapati perimeter rajah yang terbentuk ialah 4 cm, 6 cm, 8 cm, 10 cm, … mengikut pola berikut:
$$4 = 2(1) + 2$$
$$6 = 2(2) + 2$$
$$8 = 2(3) + 2$$
$$10 = 2(4) + 2$$
$$\vdots$$
∴ Kesimpulan umum secara aruhan:
$2n + 2$ atau $2(n + 1)$,
dengan $n = 1, 2, 3, 4, …$

(ii) Untuk corak ke-8, $n = 8$.
Perimeter rajah yang terbentuk
$= 2(8 + 1)$
$= 18$ cm

JAWAPAN

BAB 5: GARIS LURUS

5.1

1. Kecerunan/*Gradient* = $\frac{2}{5}$

2. Kecerunan/*Gradient* = $\frac{4}{6} = \frac{2}{3}$

5.2

1. $m_{AB} = \frac{8 - 2}{3 - 1}$

   $= \frac{6}{2}$

   $= 3$

2. $m_{CD} = \frac{5 - (-3)}{-2 - 2}$

   $= \frac{8}{-4}$

   $= -2$

3. $m_{EF} = \frac{2 - 2}{-4 - 5}$

   $= \frac{0}{-9}$

   $= 0$

4. $m_{GH} = \frac{7 - 1}{2 - 6}$

   $= \frac{6}{-4}$

   $= -\frac{3}{2}$

5. $m_{JK} = \frac{5 - (-1)}{6 - (-6)}$

   $= \frac{6}{12}$

   $= \frac{1}{2}$

6. $m_{PQ} = \frac{10 - (-4)}{2 - 6}$

   $= \frac{14}{-4}$

   $= -\frac{7}{2}$

5.3

A

1. Pintasan-*x*/*x-intercept* = -4
   Pintasan-*y*/*y-intercept* = 8
   Kecerunan/*Gradient* = $-\frac{8}{-4}$
   $= 2$

2. Pintasan-*x*/*x-intercept* = 5
   Pintasan-*y*/*y-intercept* = -3
   Kecerunan/*Gradient* = $-\frac{-3}{5}$
   $= \frac{3}{5}$

3. Pintasan-*x*/*x-intercept* = -3
   Pintasan-*y*/*y-intercept* = -9
   Kecerunan/*Gradient* = $-\frac{-9}{-3}$
   $= -3$

4. Pintasan-*x*/*x-intercept* = 6
   Pintasan-*y*/*y-intercept* = -6
   Kecerunan/*Gradient* = $-\frac{-6}{6}$
   $= 1$

5. Pintasan-*x*/*x-intercept* = 4
   Pintasan-*y*/*y-intercept* = 2
   Kecerunan/*Gradient* = $-\frac{2}{4}$
   $= -\frac{1}{2}$

6. Pintasan-*x*/*x-intercept* = -3
   Pintasan-*y*/*y-intercept* = -6
   Kecerunan/*Gradient* = $-\frac{-6}{-3}$
   $= -2$

7. Pintasan-*x*/*x-intercept* = -10
   Pintasan-*y*/*y-intercept* = 4
   Kecerunan/*Gradient* = $-\frac{4}{-10}$
   $= \frac{2}{5}$

8. Pintasan-*x*/*x-intercept* = 5
   Pintasan-*y*/*y-intercept* = 15
   Kecerunan/*Gradient* = $-\frac{15}{5}$
   $= -3$

B

1. $-\dfrac{\text{Pintasan-}y}{6} = \dfrac{1}{2}$

$\text{Pintasan-}y = \dfrac{1}{2} \times (-6)$

$= -3$

2. $-\dfrac{12}{\text{Pintasan-}x} = -3$

$\text{Pintasan-}x = \dfrac{-12}{-3}$

$= 4$

3. $m_{KL} = -\dfrac{1}{3}$

$-\dfrac{\text{Pintasan-}y}{3} = -\dfrac{1}{3}$

$\text{Pintasan-}y = -\dfrac{1}{3} \times (-3)$

$= 1$

4. $m_{PQ} = \dfrac{8-4}{4-0} = -\dfrac{4}{\text{Pintasan-}x}$

$1 = -\dfrac{4}{\text{Pintasan-}x}$

$\text{Pintasan-}x = -4$

5.4

A

1. $y = 5x + 3$

2. $y = -2x - 1$

3. $y = \dfrac{1}{4}x - 6$

4. $y = -\dfrac{1}{2}x + 5$

B

1. Kecerunan $= 4$
Pintasan-$y = -3$

2. $y = -3x - 6$
Kecerunan $= -3$
Pintasan-$y = -6$

3. $x + 3y = 9$

$3y = -x + 9$

$y = -\dfrac{1}{3}x + 3$

Kecerunan $= -\dfrac{1}{3}$

Pintasan-$y = 3$

4. $4y - 2x = 1$

$4y = 2x + 1$

$y = \dfrac{1}{2}x + \dfrac{1}{4}$

Kecerunan $= \dfrac{1}{2}$

Pintasan-$y = \dfrac{1}{4}$

5. $3x + 2y = 6$

$2y = -3x + 6$

$y = -\dfrac{3}{2}x + 3$

Kecerunan $= -\dfrac{3}{2}$

Pintasan-$y = 3$

6. $2x - 3y = -12$

$-3y = -2x - 12$

$y = \dfrac{2}{3}x + 4$

Kecerunan $= \dfrac{2}{3}$

Pintasan-$y = 4$

7. $2y + 4x + 1 = 0$

$2y = -4x - 1$

$y = -2x - \dfrac{1}{2}$

Kecerunan $= -2$

Pintasan-$y = -\dfrac{1}{2}$

8. $3x - 4y - 8 = 0$

$-4y = -3x + 8$

$y = \dfrac{3}{4}x - 2$

Kecerunan $= \dfrac{3}{4}$

Pintasan-$y = -2$

C

	Garis lurus *Straight line*	Persamaan *Equation*
1.	*AB*	$y = 3$
2.	*CD*	$x = -5$
3.	*EF*	$y = -2$
4.	*GH*	$x = 7$

D

1. $y = mx + c$
$4 = 3(1) + c$
$c = 4 - 3$
$\quad = 1$
Persamaan garis lurus:
$y = 3x + 1$

2. $y = mx + c$
$0 = \dfrac{1}{4}(-8) + c$
$c = 2$

Persamaan garis lurus:
$y = \dfrac{1}{4}x + 2$

3. $y = mx + c$
$6 = -2(5) + c$
$c = 6 + 10$
$\quad = 16$

Persamaan garis lurus:
$y = -2x + 16$

4. $y = mx + c$
$0 = \dfrac{1}{2}(-1) + c$
$c = \dfrac{1}{2}$
Persamaan garis lurus:
$y = \dfrac{1}{2}x + \dfrac{1}{2}$

5. $y = mx + c$
$-3 = 4(2) + c$
$c = -3 - 8$
$\quad = -11$

Persamaan garis lurus:
$y = 4x - 11$

E

1. $m = \dfrac{0 - 8}{4 - 0} = \dfrac{-8}{4} = -2$

Gantikan $m = -2$ dan $(4, 0)$ dalam
$y = mx + c$.
$0 = -2(4) + c$
$c = 8$
Persamaan garis lurus:
$y = -2x + 8$

2. $m = \dfrac{-2 - 2}{3 - (-1)} = \dfrac{-4}{4} = -1$

Gantikan $m = -1$ dan $(3, -2)$ dalam
$y = mx + c$.
$-2 = -1(3) + c$
$c = -2 + 3$
$\quad = 1$

Persamaan garis lurus:
$y = -x + 1$

3. $m = \dfrac{-5 - (-1)}{-2 - 6} = \dfrac{-4}{-8} = \dfrac{1}{2}$

Gantikan $m = \dfrac{1}{2}$ dan $(-2, -5)$ dalam
$y = mx + c$.
$-5 = \dfrac{1}{2}(-2) + c$
$c = -5 + 1$
$\quad = -4$

Persamaan garis lurus:
$y = \dfrac{1}{2}x - 4$

F

	Kecerunan, m *Gradient, m*	Pintasan-y, c *y-intercept, c*	Persamaan *Equation*
1.	$m = \dfrac{5-1}{5-3}$ $= \dfrac{4}{2}$ $= 2$	Gantikan $m = 2$ dan $(3, 1)$ dalam $y = mx + c$. $1 = 2(3) + c$ $c = 1 - 6$ $= -5$	$y = 2x - 5$
2.	$m = -\dfrac{-3}{6}$ $= \dfrac{1}{2}$	$c = -3$	$y = \dfrac{1}{2}x - 3$
3.	$m = -\dfrac{4}{2}$ $= -2$	$c = 4$	$y = -2x + 4$
4.	$m = \dfrac{4-2}{6-0}$ $= \dfrac{2}{6}$ $= \dfrac{1}{3}$	$c = 2$	$y = \dfrac{1}{3}x + 2$
5.	$m = \dfrac{-6-0}{3-(-6)}$ $= \dfrac{-6}{9}$ $= -\dfrac{2}{3}$	Gantikan $m = -\dfrac{2}{3}$ dan $(3, -6)$ dalam $y = mx + c$. $-6 = -\dfrac{2}{3}(3) + c$ $-6 = -2 + c$ $c = -4$	$y = -\dfrac{2}{3}x - 4$

G

1. $y = x - 5$ ...... ①
$y = 3x - 9$ ...... ②

Gantikan ① dalam ②.
$x - 5 = 3x - 9$
$x - 3x = -9 + 5$
$-2x = -4$
$x = 2$

Gantikan $x = 2$ dalam ①.
$y = 2 - 5$
$= -3$

∴ Titik persilangan $= (2, -3)$

2. $y = 2x + 1$ ...... ①
$y = x + 2$ ...... ②

Gantikan ① dalam ②.
$2x + 1 = x + 2$
$2x - x = 2 - 1$
$x = 1$

Gantikan $x = 1$ dalam ①.
$y = 2(1) + 1$
$= 3$

∴ Titik persilangan $= (1, 3)$

3. $y = 2x - 5$ ...... ①
$2y = 3x - 11$ ...... ②

Gantikan ① dalam ②.
$2(2x - 5) = 3x - 11$
$4x - 10 = 3x - 11$
$4x - 3x = -11 + 10$
$x = -1$

Gantikan $x = -1$ dalam ①.
$y = 2(-1) - 5$
$= -7$

∴ Titik persilangan $= (-1, -7)$

4. $y + x = 5$ ...... ①
$3y = 2x + 5$ ...... ②
Daripada ①: $y = 5 - x$ ...... ③

Gantikan ③ dalam ②.
$3(5 - x) = 2x + 5$
$15 - 3x = 2x + 5$
$-3x - 2x = 5 - 15$
$-5x = -10$
$x = 2$

Gantikan $x = 2$ dalam ③.
$y = 5 - 2$
$= 3$

∴ Titik persilangan $= (2, 3)$

5. $x + y = 2$ ...... ①
$4y - x = 18$ ...... ②

Daripada ①: $y = 2 - x$ ...... ③

Gantikan ③ dalam ②.
$$4(2 - x) - x = 18$$
$$8 - 4x - x = 18$$
$$-5x = 10$$
$$x = -2$$

Gantikan $x = -2$ dalam ③.
$$y = 2 - (-2)$$
$$= 4$$

$\therefore$ Titik persilangan = $(-2, 4)$

5.5

A

1. $(2, -2)$; $y = 2x - 1$

Gantikan $m = 2$ dan $(2, -2)$ dalam
$y = mx + c$.
$$-2 = 2(2) + c$$
$$c = -2 - 4$$
$$= -6$$

Persamaan garis lurus: $y = 2x - 6$

2. $(1, 5)$; $y = 3x + 9$

Gantikan $m = 3$ dan $(1, 5)$ dalam
$y = mx + c$.
$$5 = 3(1) + c$$
$$c = 5 - 3$$
$$= 2$$

Persamaan garis lurus: $y = 3x + 2$

3. $(2, 4)$; $2y = x - 5$
$$2y = x - 5$$
$$y = \frac{1}{2}x - \frac{5}{2}$$

Gantikan $m = \frac{1}{2}$ dan $(2, 4)$ dalam
$y = mx + c$.
$$4 = \frac{1}{2}(2) + c$$
$$4 = 1 + c$$
$$c = 4 - 1$$
$$= 3$$

Persamaan garis lurus: $y = \frac{1}{2}x + 3$

4. $(10, 2)$; $3x + 2y = 6$
$$3x + 2y = 6$$
$$2y = -3x + 6$$
$$y = -\frac{3}{2}x + 3$$

Gantikan $m = -\frac{3}{2}$ dan $(10, 2)$ dalam
$y = mx + c$.
$$2 = -\frac{3}{2}(10) + c$$
$$2 = -15 + c$$
$$c = 2 + 15$$
$$= 17$$

Persamaan garis lurus: $y = -\frac{3}{2}x + 17$

5. $(6, -7)$; $2y - 5x = 0$
$$2y - 5x = 0$$
$$2y = 5x$$
$$y = \frac{5}{2}x$$

Gantikan $m = \frac{5}{2}$ dan $(6, -7)$ dalam
$y = mx + c$.
$$-7 = \frac{5}{2}(6) + c$$
$$-7 = 15 + c$$
$$c = -7 - 15$$
$$= -22$$

Persamaan garis lurus: $y = \frac{5}{2}x - 22$

B

1. $m_{PQ} = m_{RS}$
$$= \frac{3 - 0}{6 - 0}$$
$$= \frac{1}{2}$$
$c_{PQ} = 5$

$\therefore$ Persamaan garis lurus PQ: $y = \frac{1}{2}x + 5$

2. $m_{PQ} = m_{RS}$
$$= -\frac{4}{2}$$
$$= -2$$

Gantikan $m = -2$ dan $(-1, -1)$ dalam $y = mx + c$.
$$-1 = -2(-1) + c$$
$$c = -1 - 2$$
$$= -3$$

$\therefore$ Persamaan garis lurus PQ: $y = -2x - 3$

C

1. (a) $y = 4$

   (b) Persamaan PQ: $y = 2x + 8$

   $m_{SR} = m_{PQ} = 2$

   Gantikan $m = 2$ dan $(5, 4)$ dalam
   $y = mx + c$.
   $4 = 2(5) + c$
   $c = 4 - 10$
   $\quad = -6$
   $\therefore$ Persamaan SR: $y = 2x - 6$

   (c) Pada paksi-x, $y = 0$.
   $0 = 2x - 6$
   $2x = 6$
   $x = 3$

   $\therefore$ Pintasan-x bagi $SR = 3$

2. (a) Kecerunan garis lurus OA, m_{OA}
   $= \dfrac{3 - 0}{1 - 0}$
   $= 3$

   (b) $m_{BC} = m_{OA} = 3$

   Gantikan $m = 3$ dan $(3, 1)$ dalam
   $y = mx + c$.
   $1 = 3(3) + c$
   $1 = 9 + c$
   $c = -8$

   $\therefore$ Persamaan garis lurus BC: $y = 3x - 8$

   (c) Pada paksi-x, $y = 0$.
   $0 = 3x - 8$
   $3x = 8$
   $x = \dfrac{8}{3}$

   $\therefore$ Pintasan-x bagi $BC = \dfrac{8}{3}$

Praktis Formatif: Kertas 1

1. B

   $P(-2, 4)$ dan $(6, 0)$
   Kecerunan $PQ = \dfrac{4 - 0}{-2 - 6}$
   $= \dfrac{4}{-8}$
   $= -\dfrac{1}{2}$

2. A

   $K(-1, 2)$ dan $L(3, -6)$

Kecerunan $KL = \dfrac{2 - (-6)}{-1 - 3}$
$= \dfrac{8}{-4}$
$= -2$

3. B

   Koordinat titik $L = (0, -6)$
   Koordinat titik $H = (-18, 0)$
   Kecerunan $HL = -\left(\dfrac{-6}{-18}\right)$
   $= -\dfrac{1}{3}$

4. C

   Kecerunan graf **A** $= -\dfrac{4}{2} = -2$

   Kecerunan graf **B** $= -\dfrac{4}{-2} = 2$

   Kecerunan graf **C** $= -\left(\dfrac{-2}{4}\right) = \dfrac{1}{2}$ ✔

   Kecerunan graf **D** $= -\left(\dfrac{-2}{-4}\right) = -\dfrac{1}{2}$

5. D

   Kecerunan $= -\dfrac{\text{Pintasan-}y}{\text{Pintasan-}x}$

   $-\dfrac{2}{5} = -\dfrac{4}{\text{Pintasan-}x}$

   Pintasan-$x = -4 \times \left(-\dfrac{5}{2}\right)$
   $= 10$

6. D

   $\dfrac{3}{4}y - x = 12$
   $\dfrac{3}{4}y = x + 12$
   $y = \dfrac{4}{3}x + 16$
   $\therefore$ Kecerunan $= \dfrac{4}{3}$

7. B

   $K(2, -5)$, $L(6, 3)$ dan $N(-2, 4)$

   Koordinat titik $M = \left(\dfrac{2 + 6}{2}, \dfrac{-5 + 3}{2}\right)$
   $= (4, -1)$

   Kecerunan $MN = \dfrac{4 - (-1)}{-2 - 4}$
   $= -\dfrac{5}{6}$

8. A

$$5y + 2x = 10$$
$$5y = -2x + 10$$
$$y = -\frac{2}{5}x + 2$$

$\therefore$ Kecerunan $= -\frac{2}{5}$

Pintasan-$y = 2$

9. D

$$3x - ky = 10$$
$$-ky = -3x + 10$$
$$y = \frac{3}{k}x - \frac{10}{k}$$
$$\frac{3}{k} = \frac{1}{3}$$
$$k = 9$$

10. A

$$3x + 4y = 12$$

Pada paksi-x, $y = 0$.
$$3x + 4(0) = 12$$
$$3x = 12$$
$$x = 4$$

$\therefore$ Pintasan-$x = 4$

11. C

$$3y + x = 2$$
$$3y = -x + 2$$
$$y = -\frac{1}{3}x + \frac{2}{3}$$

Kecerunan graf adalah negatif (\).

Pintasan-$y = \frac{2}{3}$

12. C

$(2, 5)$ dan $(-1, 1)$

Kecerunan $= \dfrac{5 - 1}{2 - (-1)}$

$\qquad\quad = \dfrac{4}{3}$

Gantikan $m = \dfrac{4}{3}$ dan $(2, 5)$ dalam $y = mx + c$.

$$5 = \frac{4}{3}(2) + c$$
$$5 = \frac{8}{3} + c$$
$$c = \frac{7}{3}$$

13. C

Gantikan $m = -3$ dan $(4, -2)$ dalam $y = mx + c$.
$$-2 = -3(4) + c$$
$$-2 = -12 + c$$
$$c = 10$$

14. B

$(9, 8)$ dan $(3, 4)$

Kecerunan $= \dfrac{8 - 4}{9 - 3}$

$\qquad\quad = \dfrac{4}{6}$

$\qquad\quad = \dfrac{2}{3}$

Gantikan $m = \dfrac{2}{3}$ dan $(3, 4)$ dalam $y = mx + c$.

$$4 = \frac{2}{3}(3) + c$$
$$4 = 2 + c$$
$$c = 2$$

15. C

Gantikan $m = 2$ dan $(-1, 3)$ dalam $y = mx + c$.
$$3 = 2(-1) + c$$
$$3 = -2 + c$$
$$c = 5$$

16. B

$$y = 2x - 8$$

Pada paksi-x, $y = 0$.
$$0 = 2x - 8$$
$$2x = 8$$
$$x = 4$$

Koordinat titik $Q = (4, 0)$

Kecerunan $PQ = -\dfrac{6}{4}$

$\qquad\qquad\quad = -\dfrac{3}{2}$

17. A

$S(-3, 6)$ dan $(-12, 0)$

Kecerunan $RS = \dfrac{6 - 0}{-3 - (-12)}$

$\qquad\qquad\quad = \dfrac{6}{9}$

$\qquad\qquad\quad = \dfrac{2}{3}$

Gantikan $m = \dfrac{2}{3}$ dan $(-3, 6)$ dalam $y = mx + c$.

$$6 = \frac{2}{3}(-3) + c$$
$$6 = -2 + c$$
$$c = 8$$

18. D

$$5x - 2y + 10 = 0$$
$$2y = 5x + 10$$
$$y = \frac{5}{2}x + 5$$

$\therefore$ Pintasan-$y = 5$

19. A

Gantikan $m = \frac{3}{4}$ dan $(-3, 0)$ dalam $y = mx + c$.

$$0 = \frac{3}{4}(-3) + c$$

$$c = \frac{9}{4}$$

Persamaan PQ : $y = \frac{3}{4}x + \frac{9}{4}$

$$4y = 3x + 9$$

20. C

Koordinat titik $P = (0, -4)$
Koordinat titik $Q = (8, 0)$

Kecerunan $PQ = -\dfrac{-4}{8}$

$$= \frac{1}{2}$$

$$2y = hx - 8$$
$$y = \frac{h}{2}x - 4$$
$$\therefore \frac{h}{2} = \frac{1}{2}$$
$$h = 1$$

21. C

Gantikan $m = -2$ dan $(-6, -4)$ dalam $y = mx + c$.
$$-4 = -2(-6) + c$$
$$-4 = 12 + c$$
$$c = -16$$

Persamaan $QR = y = -2x - 16$
Pada paksi-x, $y = 0$.
$$0 = -2x - 16$$
$$2x = -16$$
$$x = -8$$

Jarak $OQ = 8$ unit
Jarak $PQ = 10$ unit
$\therefore$ Jarak $OP = \sqrt{10^2 - 8^2}$
$$= \sqrt{36}$$
$$= 6 \text{ unit}$$

$\therefore$ Pintasan-y bagi $PQ = 6$

22. A

Pada paksi-y, $x = 0$.
$$2y + 3(0) = 10$$
$$2y = 10$$
$$y = 5$$
$\therefore$ Persamaan RS: $y = 5$

23. A

Gantikan $(3, 0)$ dalam $y = 5x + c$.
$$0 = 5(3) + c$$
$$c = -15$$

$\therefore$ Titik persilangan garis lurus itu dengan paksi-$y = (0, -15)$

24. D

$$m_{PQ} = m_{RS} = 3$$
$$-\frac{\text{Pintasan-}y}{-4} = 3$$
$$\text{Pintasan-}y = 3 \times 4$$
$$= 12$$

Praktis Formatif: Kertas 2

1. (a) $x = 1$

(b) $y = -2x - 4$

Pintasan-y bagi $PS = -4$

(c) $m_{QR} = m_{PS} = -2$

Gantikan $m = -2$ dan $(1, 6)$ dalam $y = mx + c$.
$$6 = -2(1) + c$$
$$c = 6 + 2$$
$$= 8$$

$\therefore$ Persamaan QR: $y = -2x + 8$

2. (a) $y = -6$

(b) $m_{NP} = m_{OQ} = \dfrac{0 - (-6)}{0 - 4} = -\dfrac{3}{2}$

Gantikan $m = -\dfrac{3}{2}$ dan $(-8, 7)$ dalam $y = mx + c$.

$$7 = -\frac{3}{2}(-8) + c$$
$$7 = 12 + c$$
$$c = 7 - 12$$
$$= -5$$

$\therefore$ Persamaan NP: $y = -\dfrac{3}{2}x - 5$

(c) Pada paksi-x, $y = 0$.

$$0 = -\frac{3}{2}x - 5$$
$$\frac{3}{2}x = -5$$
$$x = -5 \times \frac{2}{3}$$
$$= -\frac{10}{3}$$

$\therefore$ Pintasan-x bagi $NP = -\dfrac{10}{3}$

3. (a) $m_{QR} = m_{OP} = -2$

Gantikan $m = -2$ dan $(-8, 10)$ dalam $y = mx + c$.
$$10 = -2(-8) + c$$
$$c = 10 - 16$$
$$= -6$$

$\therefore$ Persamaan QR: $y = -2x - 6$

(b) Pada paksi-x, $y = 0$.
$$0 = -2x - 6$$
$$2x = -6$$
$$x = -3$$

$\therefore$ Pintasan-x bagi $QR = -3$

4. (a) $m_{RS} = m_{PQ}$

$$= \frac{3 - (-2)}{-4 - (-2)}$$

$$= -\frac{5}{2}$$

Gantikan $m = -\frac{5}{2}$ dan $(2, 5)$ dalam $y = mx + c$.

$$5 = -\frac{5}{2}(2) + c$$

$$5 = -5 + c$$

$$c = 5 + 5$$

$$= 10$$

$\therefore$ Persamaan RS: $y = -\frac{5}{2}x + 10$

(b) Pada paksi-x, $y = 0$.

$$0 = -\frac{5}{2}x + 10$$

$$\frac{5}{2}x = 10$$

$$x = 10 \times \frac{2}{5}$$

$$= 4$$

$\therefore$ Pintasan-x bagi $RS = 4$

5. (a) $m_{RST} = m_{POQ}$

$$= \frac{4 - 0}{-2 - 0}$$

$$= -2$$

Gantikan $m = -2$ dan $(3, 2)$ dalam $y = mx + c$.

$$2 = -2(3) + c$$

$$2 = -6 + c$$

$$c = 8$$

$\therefore$ Persamaan RST: $y = -2x + 8$

(b) Pintasan-x bagi SU = Pintasan-x bagi RST

Maka, pada paksi-x, $y = 0$.

$$0 = -2x + 8$$

$$2x = 8$$

$$x = 4$$

$\therefore$ Pintasan-x bagi SU ialah 4.

6. (a) Pada paksi-y, $x = 0$.

$$y = 2(0) - 8$$

$$= -8$$

Maka, koordinat rumah api P ialah $(0, -8)$.

Jarak $PR = 8 + 6$

$$= 14 \text{ km}$$

(b) $m_{QR} = m_{PS} = 2$

Gantikan $m = 2$ dan $(0, 6)$ dalam $y = mx + c$.

$$6 = 2(0) + c$$

$$c = 6$$

$\therefore$ Persamaan garis lurus yang menghubungkan rumah api Q dengan rumah api R ialah $y = 2x + 6$.

BAB 6: STATISTIK

6.1

A

1.

Selang kelas *Class interval*	Had bawah *Lower limit*	Had atas *Upper limit*	Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*	Saiz selang kelas *Size of class interval*
1.4 – 1.6	1.4	1.6	1.35	1.65	0.3
1.7 – 1.9	1.7	1.9	1.65	1.95	0.3
2.0 – 2.2	2.0	2.2	1.95	2.25	0.3
2.3 – 2.5	2.3	2.5	2.25	2.55	0.3

2.

Umur (tahun) *Age (years)*	Had bawah *Lower limit*	Had atas *Upper limit*	Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*	Saiz selang kelas *Size of class interval*
41 – 50	41	50	40.5	50.5	10
51 – 60	51	60	50.5	60.5	10
61 – 70	61	70	60.5	70.5	10
71 – 80	71	80	70.5	80.5	10
81 – 90	81	90	80.5	90.5	10

3.

Panjang (cm) *Length (cm)*	Had bawah *Lower limit*	Had atas *Upper limit*	Sempadan bawah *Lower boundary*	Sempadan atas *Upper boundary*	Saiz selang kelas *Size of class interval*
151 – 155	151	155	150.5	155.5	5
156 – 160	156	160	155.5	160.5	5
161 – 165	161	165	160.5	165.5	5
166 – 170	166	170	165.5	170.5	5
171 – 175	171	175	170.5	175.5	5

B

1.

Markah *Marks*	Gundal *Tally*	Kekerapan *Frequency*
60 – 64	|	1
65 – 69	|||	3
70 – 74	卌 |||	8
75 – 79	||||	4
80 – 84	||	2

2.

Umur (tahun) *Age (years)*	Gundal *Tally*	Kekerapan *Frequency*
10 – 19	||	2
20 – 29	||||	4
30 – 39	卌 ||	7
40 – 49	|||	3
50 – 59	卌	5
60 – 69	|||	3

3.

Tinggi (cm) / Height (cm)	Gundal / Tally	Kekerapan / Frequency
110 – 119	||	2
120 – 129	⅏	5
130 – 139	||||	4
140 – 149	⅏ ||	7
150 – 159	⅏ |	6

4.

Jarak (km) / Distance (km)	Gundal / Tally	Kekerapan / Frequency
1.1 – 1.3	||||	4
1.4 – 1.6	⅏ |	6
1.7 – 1.9	|||	3
2.0 – 2.2	||||	4
2.3 – 2.5	|	1
2.6 – 2.8	||	2

6.2

A

1.

Umur (tahun) / Age (years)	Kekerapan / Frequency	Titik tengah / Midpoint
31 – 40	2	35.5
41 – 50	5	45.5
51 – 60	6	55.5
61 – 70	8	65.5
71 – 80	4	75.5

(a) Kelas mod/*Modal class* = 61 – 70 tahun

(b) Min/*Mean*

$$= \frac{(2 \times 35.5) + (5 \times 45.5) + (6 \times 55.5) + (8 \times 65.5) + (4 \times 75.5)}{2 + 5 + 6 + 8 + 4}$$

$$= \frac{1\ 457.5}{25}$$

$$= 58.3 \text{ tahun}$$

2.

Tinggi (cm) / Height (cm)	Kekerapan / Frequency	Titik tengah / Midpoint
151 – 155	4	153
156 – 160	7	158
161 – 165	10	163
166 – 170	8	168
171 – 175	6	173
176 – 180	5	178

(a) Kelas mod/*Modal class* = 161 – 165 cm

(b) Min/*Mean*

$$= \frac{\begin{array}{c}(4 \times 153) + (7 \times 158) + (10 \times 163) + \\ (8 \times 168) + (6 \times 173) + (5 \times 178)\end{array}}{4 + 7 + 10 + 8 + 6 + 5}$$

$$= \frac{6\ 620}{40}$$

$$= 165.5 \text{ cm}$$

3.

Panjang (m) / Length (m)	Kekerapan / Frequency	Titik tengah / Midpoint
4.0 – 4.4	3	4.2
4.5 – 4.9	6	4.7
5.0 – 5.4	5	5.2
5.5 – 5.9	4	5.7
6.0 – 6.4	2	6.2

(a) Kelas mod/*Modal class* = 4.5 – 4.9 m

(b) Min/*Mean*

$$= \frac{\begin{array}{c}(3 \times 4.2) + (6 \times 4.7) + (5 \times 5.2) + \\ (4 \times 5.7) + (2 \times 6.2)\end{array}}{3 + 6 + 5 + 4 + 2}$$

$$= \frac{102.0}{20}$$

$$= 5.1 \text{ m}$$

6.3

1. (a)

Umur (tahun) / Age (years)	Kekerapan / Frequency	Titik tengah / Midpoint
6 – 10	6	8
11 – 15	10	13
16 – 20	12	18
21 – 25	8	23
26 – 30	10	28
31 – 35	4	33

(b) Kelas mod = 16 – 20 tahun

(c) Min anggaran umur

$$= \frac{\begin{array}{c}(6 \times 8) + (10 \times 13) + (12 \times 18) + \\ (8 \times 23) + (10 \times 28) + (4 \times 33)\end{array}}{6 + 10 + 12 + 8 + 10 + 4}$$

$$= \frac{990}{50}$$

$$= 19.8 \text{ tahun}$$

(d)

Kekerapan / Umur (tahun)
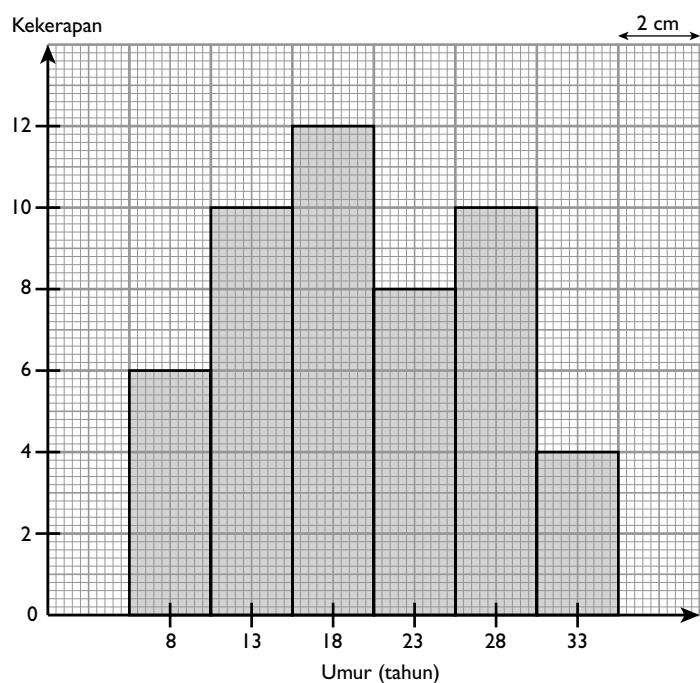
(e) Bilangan pelawat yang berumur 16 tahun ke bawah
= 6 + 10
= 16

2. (a)

Wang simpanan *Savings* (RM)	Kekerapan *Frequency*	Titik tengah *Midpoint*
1 – 10	2	5.5
11 – 20	3	15.5
21 – 30	5	25.5
31 – 40	6	35.5
41 – 50	7	45.5
51 – 60	4	55.5
61 – 70	3	65.5

(b) Min anggaran wang simpanan

$$= \frac{(2 \times 5.5) + (3 \times 15.5) + (5 \times 25.5) + (6 \times 35.5) + (7 \times 45.5) + (4 \times 55.5) + (3 \times 65.5)}{2 + 3 + 5 + 6 + 7 + 4 + 3}$$

$$= \frac{1\ 135}{30}$$

$$= RM37.83$$

(c)

Kekerapan

2 cm

Wang simpanan (RM)
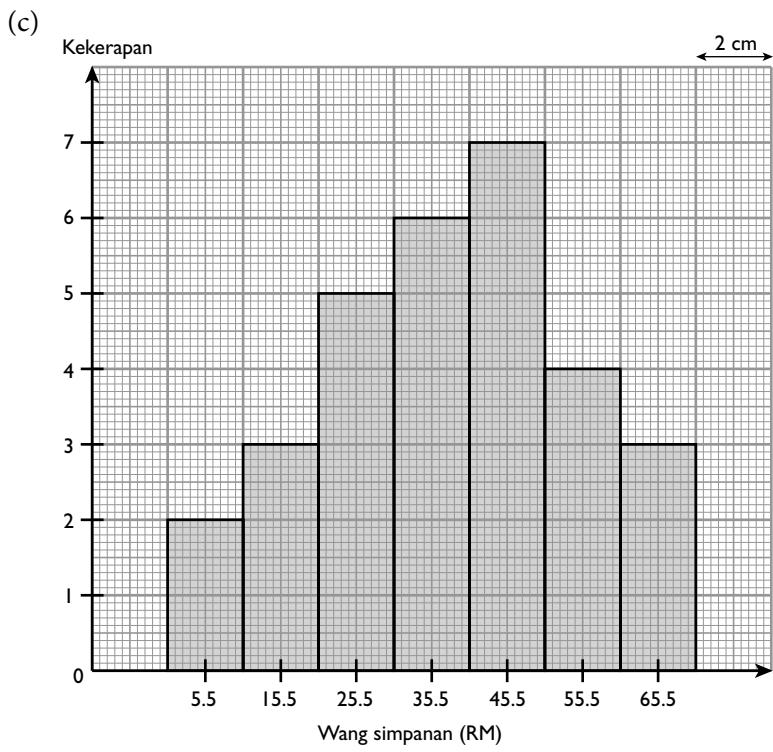
(d) Bilangan murid yang menyimpan melebihi RM50
   = 4 + 3
   = 7

6.4

Ⓐ

1.

Kekerapan
Frequency

Masa (minit)
Time (minutes)
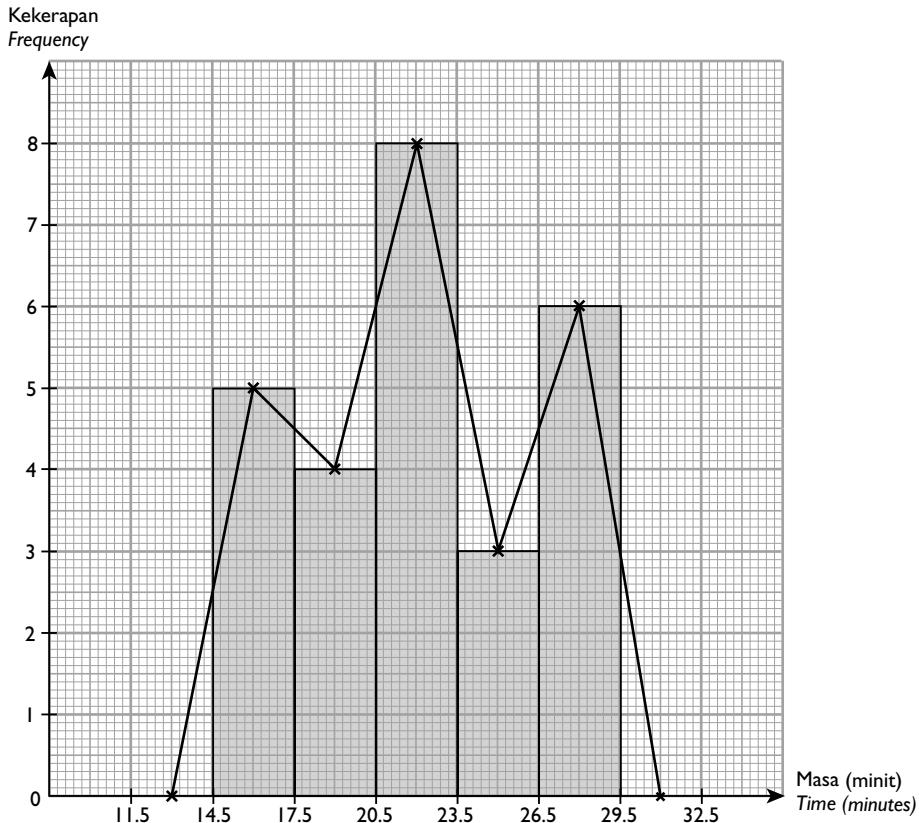
2.
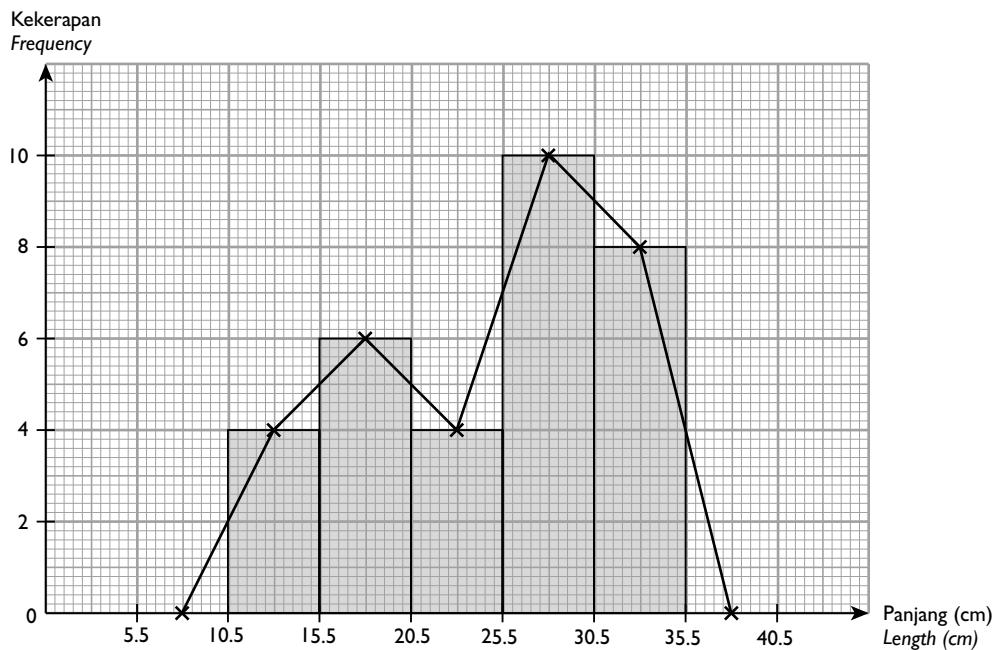
B

1. (a)

Masa (minit) *Time (minutes)*	Kekerapan *Frequency*	Titik tengah *Midpoint*
20 – 24	1	22
25 – 29	4	27
30 – 34	2	32
35 – 39	6	37
40 – 44	5	42
45 – 49	2	47

(b) Min anggaran masa

$$= \frac{(1 \times 22) + (4 \times 27) + (2 \times 32) + (6 \times 37) + (5 \times 42) + (2 \times 47)}{1 + 4 + 2 + 6 + 5 + 2}$$

$$= \frac{720}{20}$$

$$= 36 \text{ minit}$$

(c)

Kekerapan

2 cm

Masa (minit)
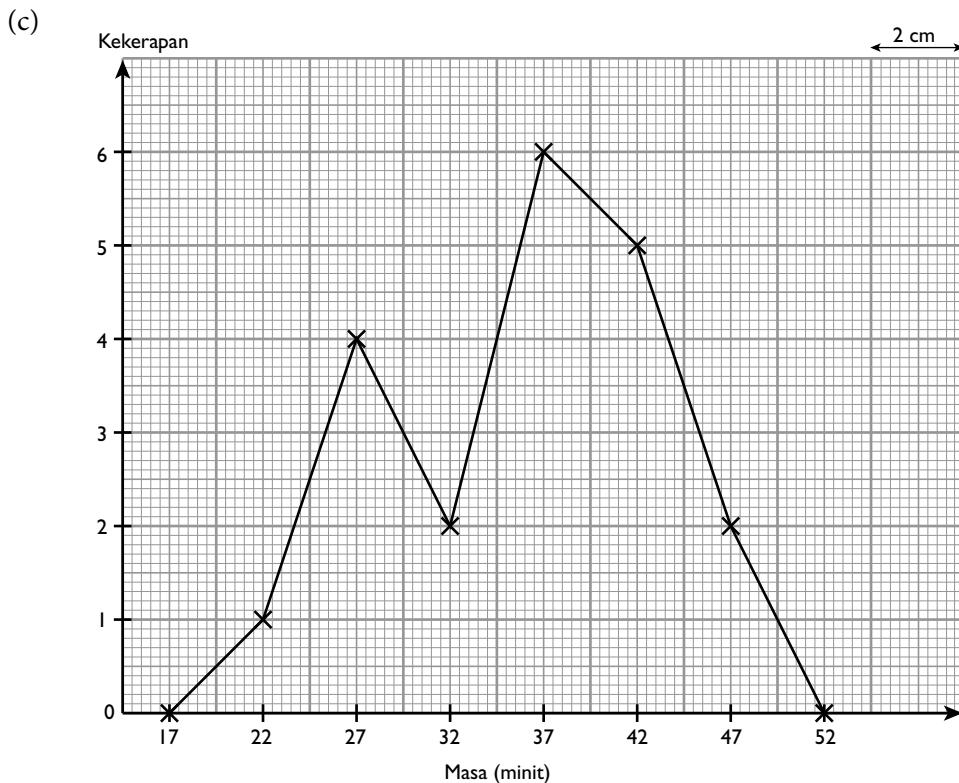
(d) Kelas mod ialah 35 – 39 minit. (Terima jawapan lain yang munasabah)

2. (a)

Tinggi (cm) Height (cm)	Kekerapan Frequency	Titik tengah Midpoint
121 – 125	2	123
126 – 130	3	128
131 – 135	6	133
136 – 140	4	138
141 – 145	6	143
146 – 150	3	148

(b) Min anggaran tinggi

$$= \frac{(2 \times 123) + (3 \times 128) + (6 \times 133) + (4 \times 138) + (6 \times 143) + (3 \times 148)}{2 + 3 + 6 + 4 + 6 + 3}$$

$$= \frac{3\ 282}{24}$$

$$= 136.75 \text{ cm}$$

(c)

Kekerapan

2 cm
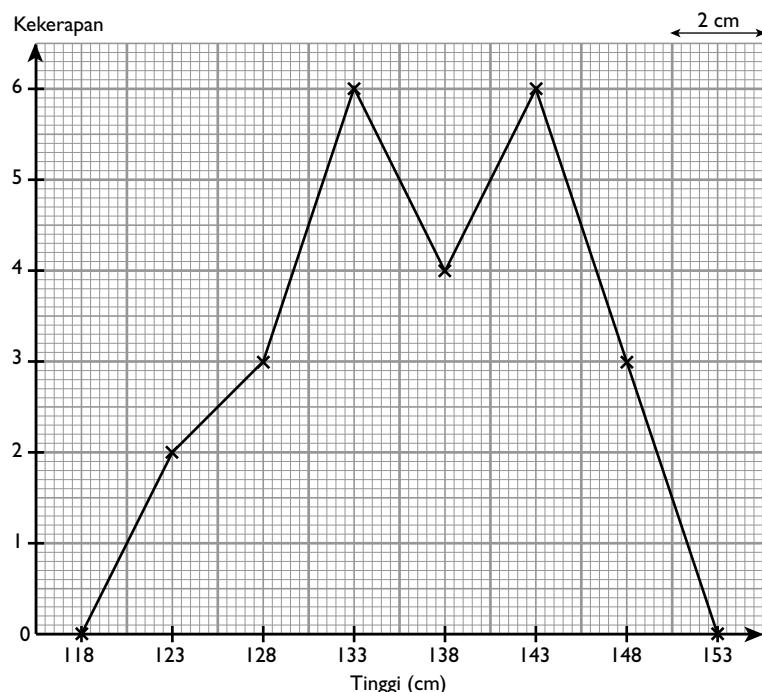
Tinggi (cm)

(d) Peratusan tanaman yang tingginya lebih daripada 140 cm

$$= \frac{6 + 3}{24} \times 100\%$$

$$= \frac{9}{24} \times 100\%$$

$$= 37.5\%$$

6.5

1.

Markah *Marks*	Kekerapan *Frequency*	Kekerapan longgokan *Cumulative frequency*	Sempadan atas *Upper boundary*
21 – 30	0	0	30.5
31 – 40	2	0 + 2 = 2	40.5
41 – 50	5	2 + 5 = 7	50.5
51 – 60	8	7 + 8 = 15	60.5
61 – 70	9	15 + 9 = 24	70.5
71 – 80	5	24 + 5 = 29	80.5
81 – 90	1	29 + 1 = 30	90.5
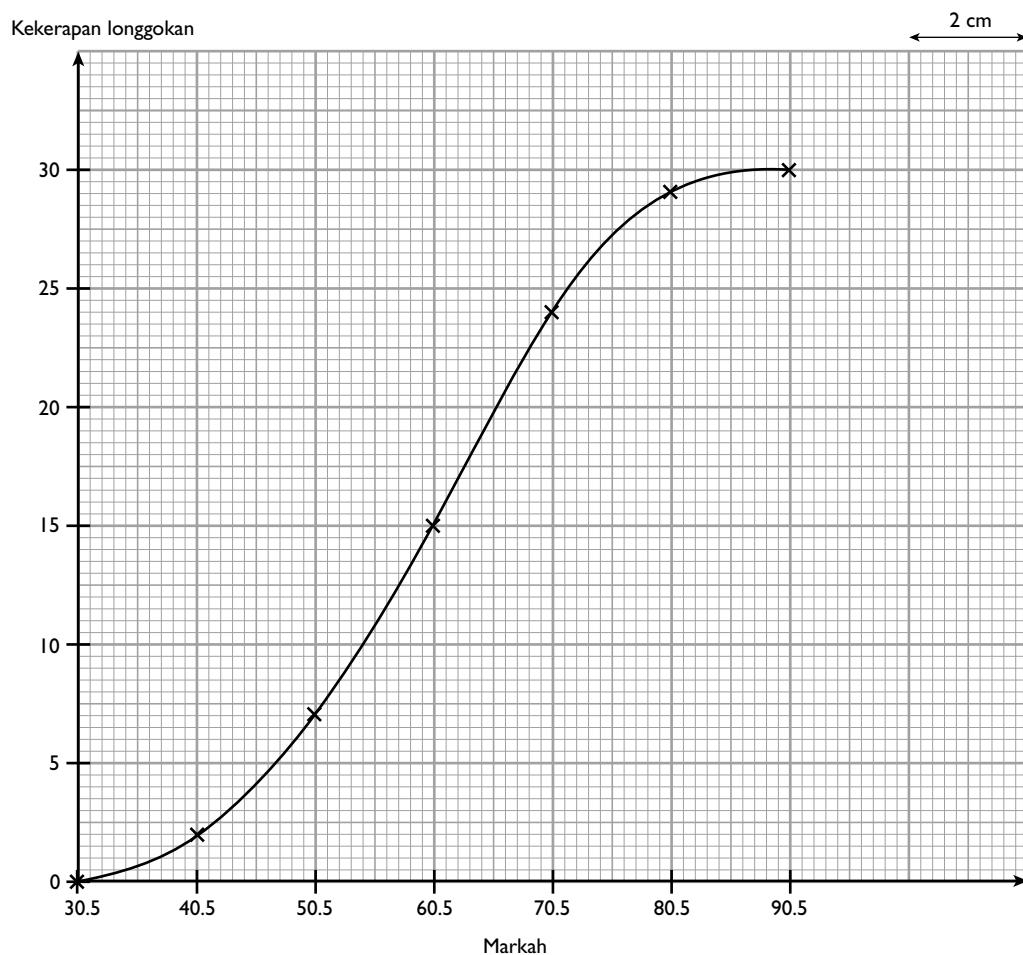
2.

Panjang (cm) *Length (cm)*	Kekerapan *Frequency*	Kekerapan longgokan *Cumulative frequency*	Sempadan atas *Upper boundary*
140 – 144	0	0	144.5
145 – 149	4	4	149.5
150 – 154	8	12	154.5
155 – 159	12	24	159.5
160 – 164	23	47	164.5
165 – 169	18	65	169.5
170 – 174	11	76	174.5
175 – 179	4	80	179.5

Kekerapan longgokan vs Panjang (cm)

6.6

A
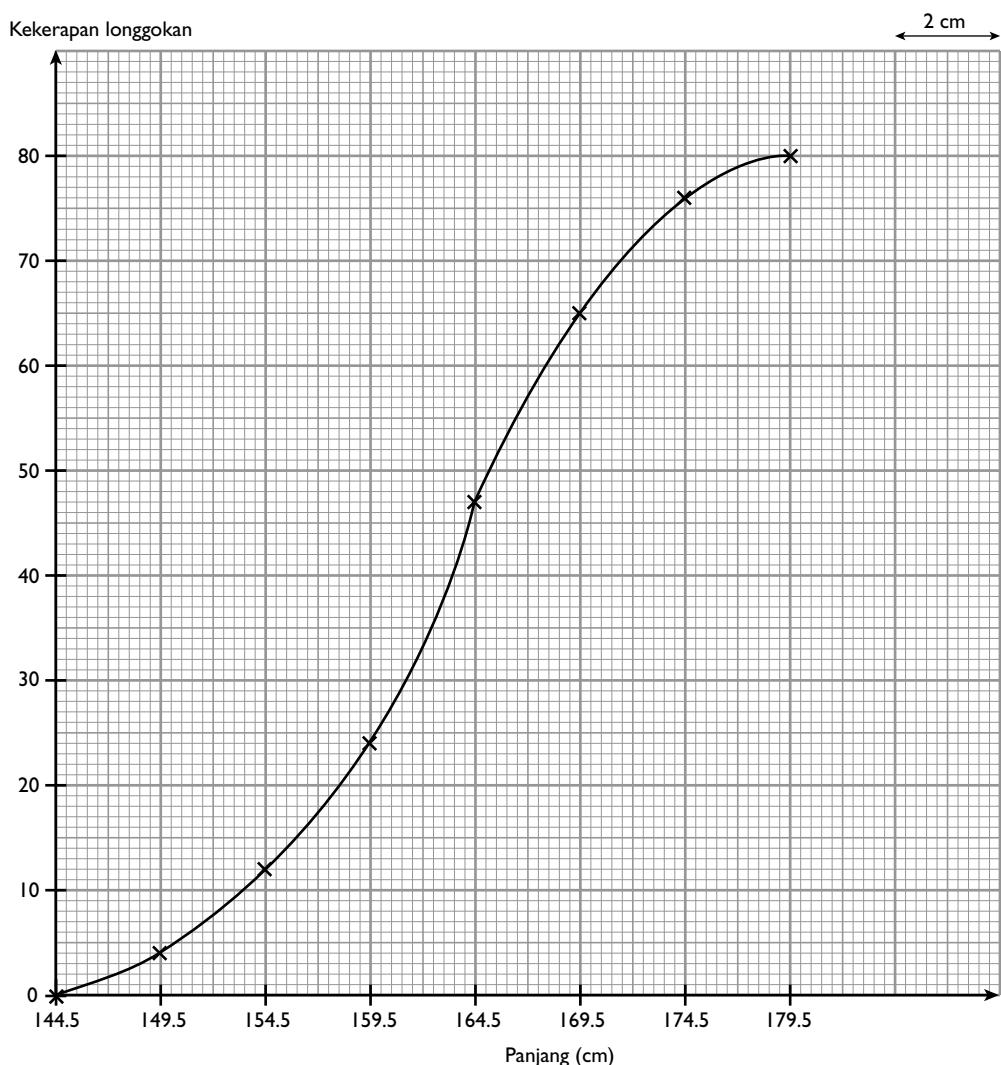
1. (a) Median = 72.5 saat

   (b) Kuartil pertama = 62.5 saat

   (c) Kuartil ketiga = 77.5 saat

   (d) Julat antara kuartil = 77.5 – 62.5
   = 15 saat

2. (a) Median = 35.5 tahun

   (b) Kuartil pertama = 26.5 tahun

   (c) Kuartil ketiga = 42.5 tahun

   (d) Julat antara kuartil = 42.5 – 26.5
   = 16 tahun

B

(a) 66.5 mata

(b) 70 mata

(c) Julat antara kuartil = 70 – 62
$$= 8 \text{ mata}$$

(d) Bilangan peserta yang skornya melebihi 75 mata
$$= 160 - 142$$
$$= 18$$

(e) Pecahan peserta yang skornya kurang daripada 58 mata
$$= \frac{20}{160}$$
$$= \frac{1}{8}$$

Praktis Formatif: Kertas 1

1. **B**

   $x < 7$

   Nilai maksimum bagi $x = 6$

2. **D**

   Peratusan anak pokok yang tingginya kurang daripada 16 cm
   $$= \frac{9 + 18 + 17}{50} \times 100\%$$
   $$= \frac{44}{50} \times 100\%$$
   $$= 88\%$$

3. **B**

Jisim (kg)	Titik tengah	Kekerapan
10 – 19	14.5	2
20 – 29	24.5	4
30 – 39	34.5	10
40 – 49	44.5	8
50 – 59	54.5	6

   Min anggaran sebuah kotak
   $$= \frac{(14.5 \times 2) + (24.5 \times 4) + (34.5 \times 10) + (44.5 \times 8) + (54.5 \times 6)}{2 + 4 + 10 + 8 + 6}$$
   $$= \frac{1\,155}{30}$$
   $$= 38.5 \text{ kg}$$

4. **C**

Mata	Kekerapan longgokan	Kekerapan
15	5	5
16	12	12 – 5 = 7
17	20	20 – 12 = 8
18	30	30 – 20 = 10
19	36	36 – 30 = 6
20	40	40 – 36 = 4

   Mod = 18 mata
   (Kekerapan paling tinggi, iaitu 10)

5. **C**

   Daripada rajah:

Tinggi (cm)	Titik tengah	Kekerapan
130 – 134	132	7
135 – 139	137	10
140 – 144	142	12
145 – 149	147	11
150 – 154	152	10

   Min tinggi seorang murid
   $$= \frac{(132 \times 7) + (137 \times 10) + (142 \times 12) + (147 \times 11) + (152 \times 10)}{7 + 10 + 12 + 11 + 10}$$
   $$= \frac{7\,135}{50}$$
   $$= 142.7 \text{ cm}$$

6. **C**

   Bilangan murid yang memperoleh lebih daripada 24 mata
   $$= 5 + 4$$
   $$= 9$$

7. **C**

Panjang (cm)	Kekerapan	Kekerapan longgokan
101 – 110	2	2
111 – 120	8 – 2 = 6	8
121 – 130	w – 8 = 10	w
131 – 140	27 – w = 9	27
141 – 150	30 – 27 = 3	30

   $w - 8 = 10$ **atau** $27 - w = 9$
   $\quad w = 10 + 8$ $\qquad\quad w = 27 - 9$
   $\qquad = 18$ $\qquad\qquad\quad = 18$

8. A

Kelas mod = 160 – 170 cm
Maka, $x > 8$
Nilai x **tidak** mungkin ialah 7.

9. C

Markah	Kekerapan	Titik tengah
51 – 55	6	53
56 – 60	16 – 6 = 10	58
61 – 65	28 – 16 = 12	63
66 – 70	36 – 28 = 8	68

Min anggaran markah

$$= \frac{6(53) + 10(58) + 12(63) + 8(68)}{36}$$

10. A

Saiz kasut	Kekerapan
4	x
5	$10 - x$
6	14 – 10 = 4
7	16 – 14 = 2
8	17 – 16 = 1

Mod bagi saiz kasut itu ialah 5.
$10 - x > 4$
$x < 6$
Nilai x yang mungkin = 1, 2, 3, ④, 5

Praktis Formatif: Kertas 2

1. (a)

Selang kelas *Class interval*	Kekerapan *Frequency*	Titik tengah *Midpoint*
25 – 29	6	27
30 – 34	9	32
35 – 39	8	37
40 – 44	6	42
45 – 49	2	47
50 – 54	1	52

(b)

$$\text{Min} = \frac{\begin{array}{c}(6 \times 27) + (9 \times 32) + (8 \times 37) + \\ (6 \times 42) + (2 \times 47) + (1 \times 52)\end{array}}{6 + 9 + 8 + 6 + 2 + 1}$$
$$= \frac{1\ 144}{32}$$
$$= 35.75$$

(c)
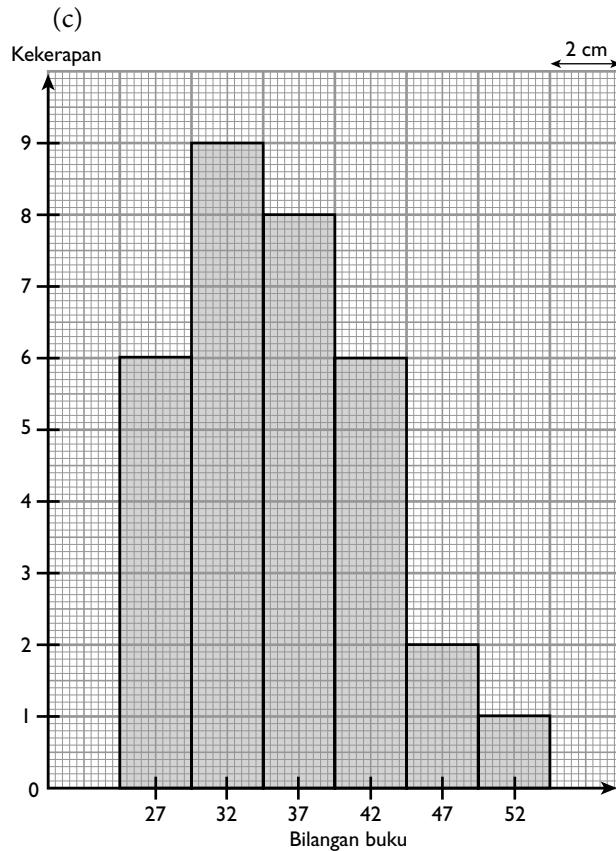
(d) Bilangan murid yang meminjam lebih daripada 44 buah buku
= 2 + 1
= 3

2. (a)

Jarak *Distance* **(km)**	Kekerapan *Frequency*	Titik tengah *Midpoint*
1.0 – 1.9	2	1.45
2.0 – 2.9	3	2.45
3.0 – 3.9	9	3.45
4.0 – 4.9	5	4.45
5.0 – 5.9	2	5.45
6.0 – 6.9	3	6.45
7.0 – 7.9	1	7.45

(b) Saiz selang kelas = 2.95 – 1.95
= 1.0 km

(c) Min anggaran jarak

$$= \frac{\begin{array}{c}(2 \times 1.45) + (3 \times 2.45) + (9 \times 3.45) + \\ (5 \times 4.45) + (2 \times 5.45) + (3 \times 6.45) + \\ (1 \times 7.45)\end{array}}{2 + 3 + 9 + 5 + 2 + 3 + 1}$$
$$= \frac{101.25}{25}$$
$$= 4.05 \text{ km}$$

(d)

Kekerapan / Jarak (km)

2 cm
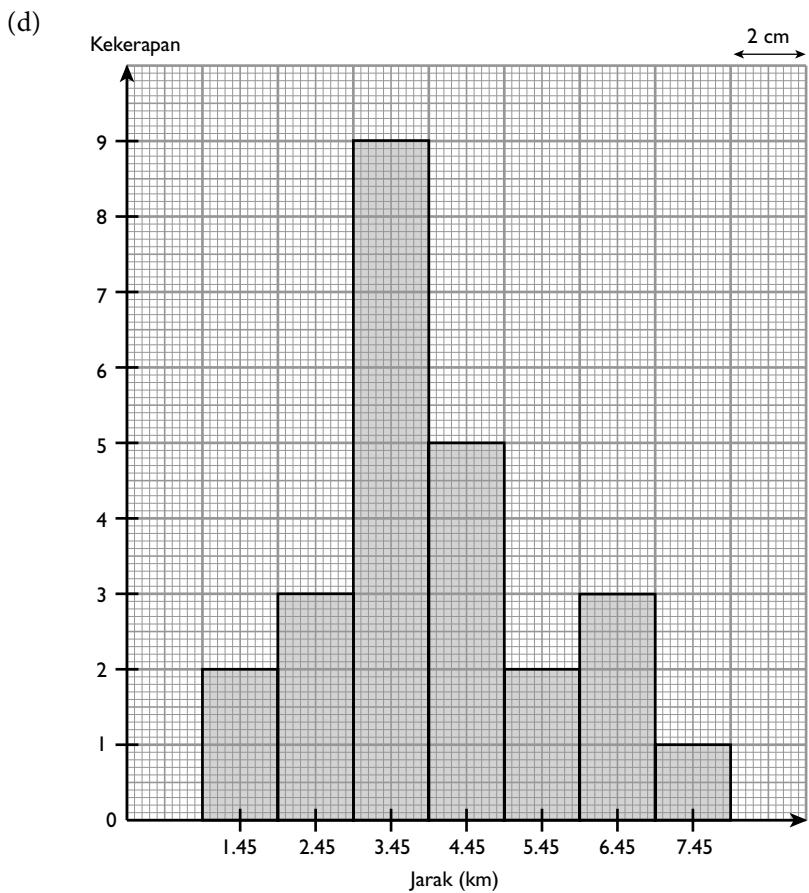
(e) Kelas mod ialah 3.0 – 3.9 km. (Terima jawapan lain yang munasabah)

3. (a)

Tinggi Height (cm)	Kekerapan Frequency	Titik tengah Midpoint
126 – 130	1	128
131 – 135	3	133
136 – 140	5	138
141 – 145	8	143
146 – 150	6	148
151 – 155	4	153
156 – 160	3	158

(b) Kelas mod = 141 – 145 cm

(c) Min anggaran tinggi

$$= \frac{(1 \times 128) + (3 \times 133) + (5 \times 138) + (8 \times 143) + (6 \times 148) + (4 \times 153) + (3 \times 158)}{1 + 3 + 5 + 8 + 6 + 4 + 3}$$

$$= \frac{4\ 335}{30}$$

$$= 144.5 \text{ cm}$$

(d)
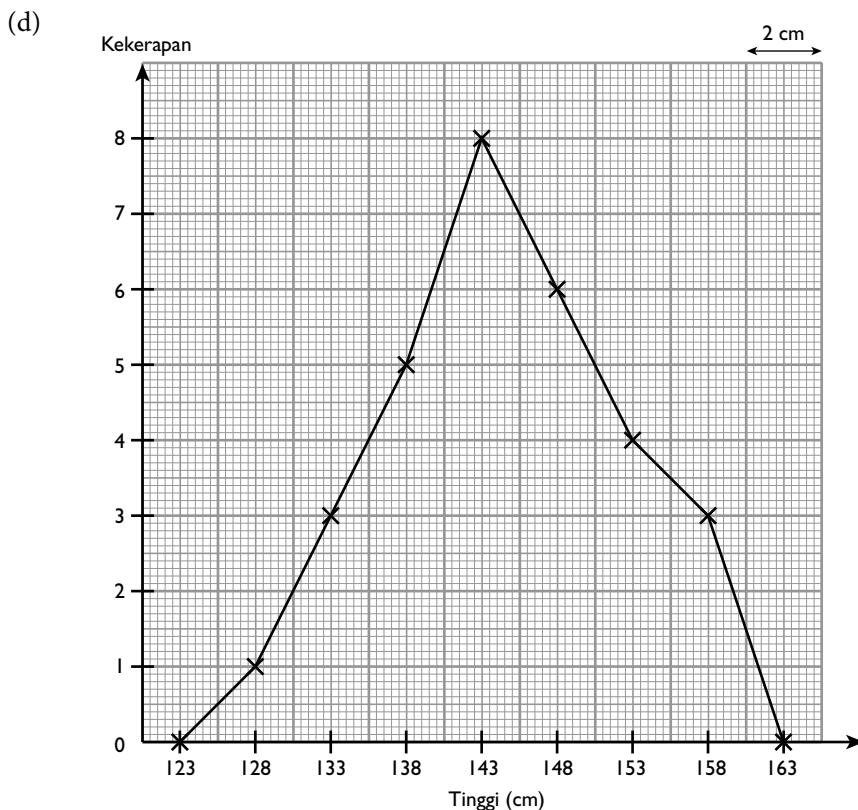
(e) Bilangan murid yang tingginya kurang daripada 138 cm
= 1 + 3
= 4

4. (a) (i)

Umur (tahun) Age (years)	Kekerapan Frequency	Titik tengah Midpoint	Sempadan atas Upper boundary	Kekerapan longgokan Cumulative frequency
15 – 19	0	17	19.5	0
20 – 24	3	22	24.5	3
25 – 29	8	27	29.5	11
30 – 34	10	32	34.5	21
35 – 39	12	37	39.5	33
40 – 44	9	42	44.5	42
45 – 49	5	47	49.5	47
50 – 54	1	52	54.5	48

(ii) Kelas mod = 35 – 39 tahun

(b) Min anggaran umur

$$= \frac{(3 \times 22) + (8 \times 27) + (10 \times 32) + (12 \times 37) + (9 \times 42) + (5 \times 47) + (1 \times 52)}{3 + 8 + 10 + 12 + 9 + 5 + 1}$$

$$= \frac{1\ 711}{48}$$

= 35.65 tahun

(c)

Kekerapan longgokan

2 cm

Umur (tahun)
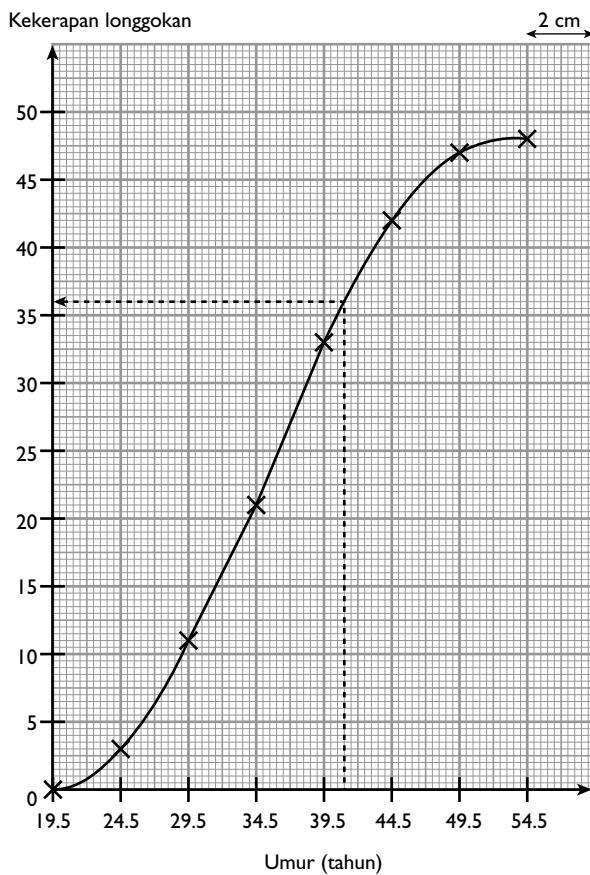
(d) Bilangan penderma darah lelaki yang berumur lebih daripada 41 tahun
= 48 – 36
= 12

5. (a)

Markah *Marks*	Kekerapan *Frequency*	Titik tengah *Midpoint*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
20 – 29	0	24.5	29.5	0
30 – 39	3	34.5	39.5	3
40 – 49	5	44.5	49.5	8
50 – 59	9	54.5	59.5	17
60 – 69	13	64.5	69.5	30
70 – 79	16	74.5	79.5	46
80 – 89	10	84.5	89.5	56
90 – 99	4	94.5	99.5	60

(b) Min anggaran markah

$$= \frac{(3 \times 34.5) + (5 \times 44.5) + (9 \times 54.5) + (13 \times 64.5) + (16 \times 74.5) + (10 \times 84.5) + (4 \times 94.5)}{3 + 5 + 9 + 13 + 16 + 10 + 4}$$

$$= \frac{4\ 070}{60}$$

$$= 67.83$$

(c)

Kekerapan longgokan
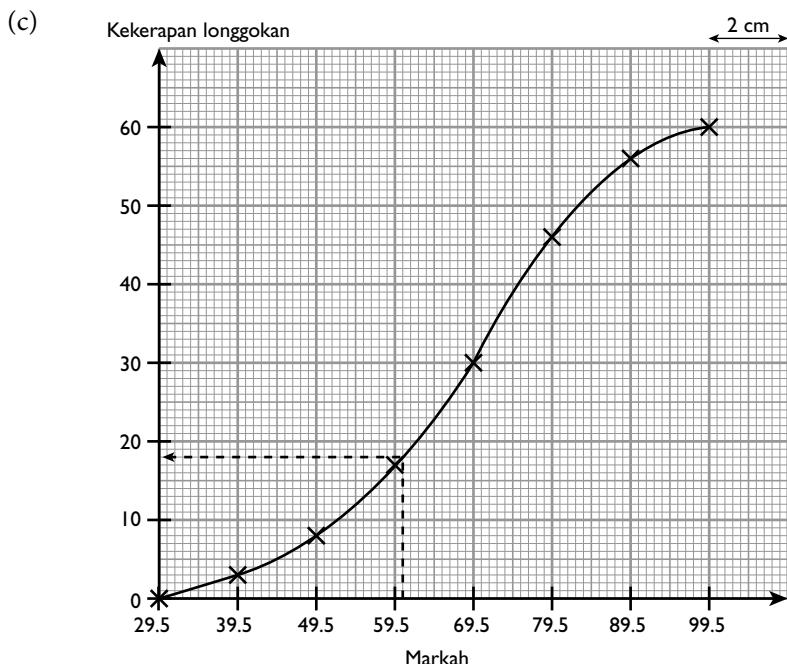
Markah

(d) Peratusan murid yang memperoleh kurang daripada 60 markah

$= \dfrac{18}{60} \times 100\%$

$= 30\%$

6. (a)

Jisim (kg) Mass (kg)	Sempadan atas Upper boundary	Kekerapan Frequency	Kekerapan longgokan Cumulative frequency
21 – 30	30.5	0	0
31 – 40	40.5	8	8
41 – 50	50.5	12	20
51 – 60	60.5	21	41
61 – 70	70.5	27	68
71 – 80	80.5	10	78
81 – 90	90.5	2	80

(b) Daripada histogram, min anggaran jisim

$= \dfrac{(8 \times 35.5) + (12 \times 45.5) + (21 \times 55.5) + (27 \times 65.5) + (10 \times 75.5) + (2 \times 85.5)}{8 + 12 + 21 + 27 + 10 + 2}$

$= \dfrac{4\,690}{80}$

$= 58.625$ kg

(c)

Kekerapan longgokan

2 cm

80

70

60

50

40

30

20

10

0

30.5 40.5 50.5 60.5 70.5 80.5 90.5

Jisim (kg)
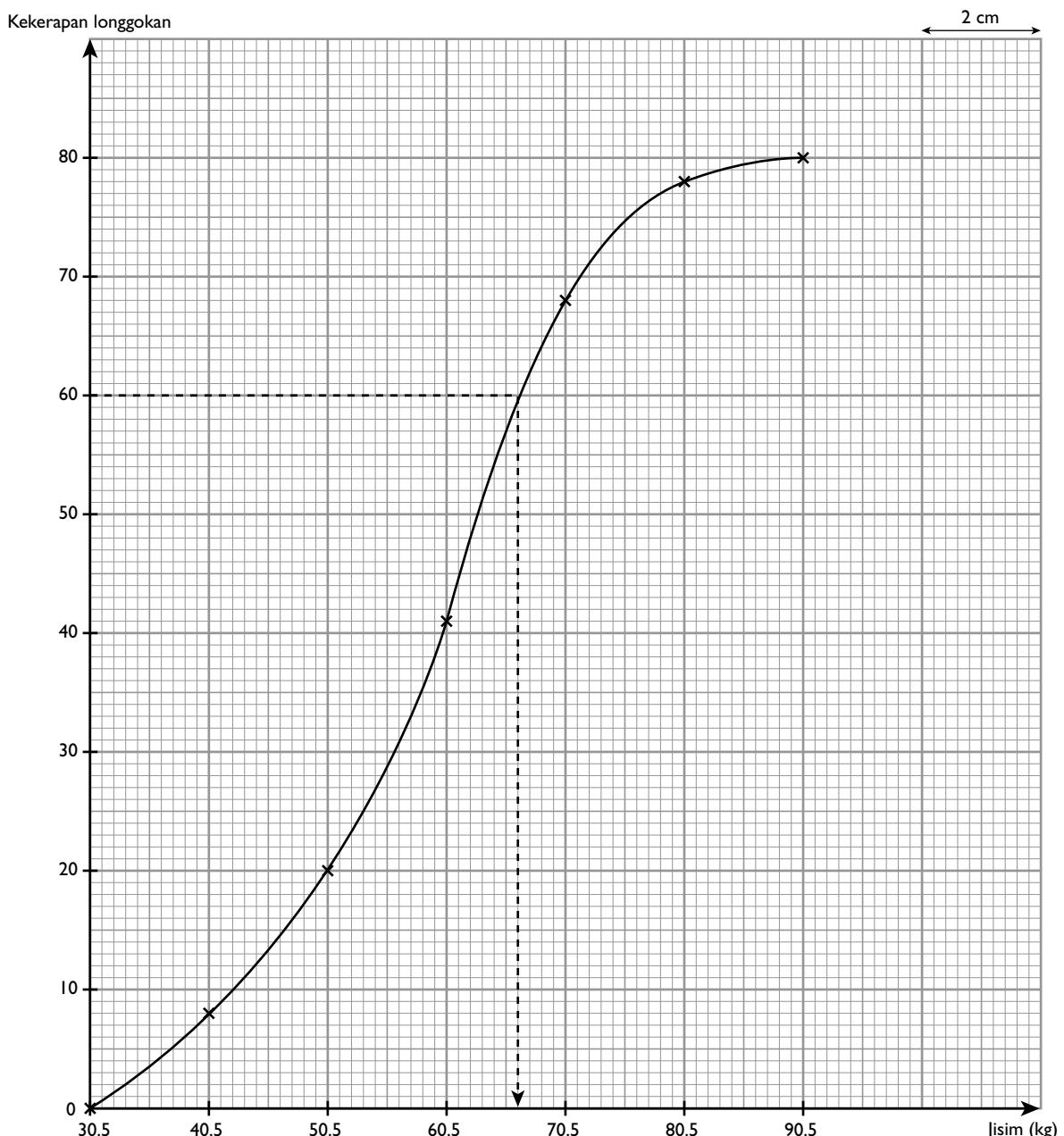
(d) 66.5 kg

JAWAPAN

BAB 7: KEBARANGKALIAN I

7.1

A

1. $S = \{6, 3, 4, 0, 9\}$

2. $S = \{9, 10, 11, 12, 13, 14\}$

3. $S = \{H, U, J, A, N\}$

4. $S = \{16, 17, 18, 19\}$

5. $S = \{(1, 7), (1, 8), (2, 7), (2, 8)\}$

6. $S = \{(A, C), (A, D), (A, E), (B, C), (B, D),$ $(B, E)\}$

7.2

1. $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,$ $14, 15\}$

    (a) $\{2, 3, 5, 7, 11, 13\}$

    (b) $\{5, 10, 15\}$

2. $S = \{12, 15, 16, 18, 24, 25\}$

    (a) $\{12, 15, 18, 24\}$

    (b) $\{16, 25\}$

3. $S = \{11, 12, 16, 17, 22, 23, 25, 31, 35, 36, 57, 73\}$

    (a) $\{11, 17, 23, 25, 31, 35, 57, 73\}$

    (b) $\{23, 31, 73\}$

4. $S = \{71, 72, 73, 74, 75, 76, 77, 78, 79\}$

    (a) $\{71, 73, 75, 77, 79\}$

    (b) $\{75, 76, 77, 78, 79\}$

5. $S = \{AA, AB, AC, BA, BB, BC, CA, CB, CC\}$

    (a) $\{AA, BB, CC\}$

    (b) $\{AA, AB, AC, BA, CA\}$

7.3

1. Bilangan papan litar yang mempunyai kecacatan

    $= \dfrac{1}{800} \times 40\,000$

    $= 50$

2. P(Gambar) $= \dfrac{45}{100}$

    $= \dfrac{9}{20}$

Bilangan kali 'Gambar' muncul untuk 700 kali lambungan duit syiling

$= \dfrac{9}{20} \times 700$

$= 315$

3. Bilangan pekerja yang gajinya melebihi RM1 300

    $= 65 + 20$

    $= 85$

    P(pekerja yang gajinya melebihi RM1 300)

    $= \dfrac{85}{200}$

    $= \dfrac{17}{40}$

4. (a) Bilangan kad berlabel dengan huruf vokal $= 4$

    P(kad berlabel dengan huruf vokal) $= \dfrac{4}{9}$

    (b) Katakan bilangan kad berlabel dengan H di dalam kotak $= x$.

    P(kad berlabel dengan huruf E) $= \dfrac{1}{5}$

    $$\dfrac{3}{9 + x} = \dfrac{1}{5}$$

    $$15 = 9 + x$$

    $$x = 15 - 9$$

    $$= 6$$

5. (a) P(Gred A) $= \dfrac{1}{8}$

    $$\dfrac{25}{87 + x} = \dfrac{1}{8}$$

    $$200 = 87 + x$$

    $$x = 113$$

    (b) Bilangan murid yang lulus $= 25 + 22 + 113$
    $= 160$

    P(murid yang lulus) $= \dfrac{160}{200}$

    $$= \dfrac{4}{5}$$

Praktis Formatif: Kertas 1

1. **B**

    P(kad berlabel L) $= \dfrac{2}{10}$

    $$= \dfrac{1}{5}$$

2. A

$\{9, 25\}$

P(kuasa dua sempurna) $= \dfrac{2}{7}$

3. B

P(bola berwarna merah)

$= \dfrac{60}{120 + 90 + 150 + 60}$

$= \dfrac{60}{420}$

$= \dfrac{1}{7}$

4. D

Bilangan murid yang gagal

$= \dfrac{1}{9} \times 36$

$= 4$

Bilangan murid yang lulus

$= 36 - 4$

$= 32$

5. B

Katakan bilangan pekerja asing $= p$.

P(pekerja tempatan) $= \dfrac{3}{7}$

$\dfrac{27}{27 + p} = \dfrac{3}{7}$

$27 \times \dfrac{7}{3} = 27 + p$

$63 = 27 + p$

$p = 36$

6. D

P(bola putih) $= \dfrac{22}{100 + 22}$

$= \dfrac{22}{122}$

$= \dfrac{11}{61}$

7. B

$\{2, 3, 5\}$

Bilangan peluang mendapat nombor perdana

$= \dfrac{102 + 64 + 82}{72 + 102 + 64 + 92 + 82 + 88} \times 100$

$= \dfrac{248}{500} \times 100$

$= 49.6$

≈ 50

8. B

Jumlah bilangan pekerja di kilang X dan Y

$= 120 + 90$

$= 210$

P(pekerja lelaki) $= 1 - \dfrac{5}{7}$

$= \dfrac{2}{7}$

$\therefore$ Bilangan pekerja lelaki $= \dfrac{2}{7} \times 210$

$= 60$

9. B

Bilangan bunga kuning $= \dfrac{1}{3} \times 45$

$= 15$

Bilangan bunga ungu $= 45 - 20 - 15$

$= 10$

10. B

Katakan bilangan pen hitam $= h$.

P(pen merah) $= \dfrac{3}{8}$

$\dfrac{24}{24 + h} = \dfrac{3}{8}$

$24 \times \dfrac{8}{3} = 24 + h$

$64 = 24 + h$

$h = 40$

Jumlah bilangan pen $= 24 + 40$

$= 64$

11. B

Katakan bilangan bola biru $= y$.

P(bola kuning) $= \dfrac{1}{3}$

$\dfrac{6}{8 + 6 + y} = \dfrac{1}{3}$

$\dfrac{6}{14 + y} = \dfrac{1}{3}$

$18 = 14 + y$

$y = 4$

P(bola biru) $= \dfrac{4}{14 + 4}$

$= \dfrac{4}{18}$

$= \dfrac{2}{9}$

12. C

Bola merah: $10 + 8 = 18$

Bola hijau: $21 + 1 = 22$

$$P(\text{bola merah}) = \frac{18}{18 + 22}$$
$$= \frac{18}{40}$$
$$= \frac{9}{20}$$

13. C

$$P(\text{murid yang gagal}) = \frac{1}{8}$$
$$\frac{x + 1}{16 + 19 + x + 1} = \frac{1}{8}$$
$$\frac{x + 1}{36 + x} = \frac{1}{8}$$
$$8x + 8 = 36 + x$$
$$7x = 28$$
$$x = 4$$

14. B

Bilangan pen hitam pada asalnya
$$= \frac{2}{3} \times 90$$
$$= 60$$

Bilangan pen hitam yang perlu dikeluarkan daripada kotak = k.

$$P(\text{pen hitam}) = \frac{1}{2}$$
$$\frac{60 - k}{90 - k} = \frac{1}{2}$$
$$120 - 2k = 90 - k$$
$$k = 30$$

JAWAPAN

BAB 8: BULATAN III

8.1

A

1. $x = 180 - 90 - 70$
$= 20$

$y = 10$

2. $x = 27$

$y = 180 - 90 - 27$
$= 63$

3. $x = 65$

$\angle OPR = 180° - 90° - 65°$
$= 25°$

$y = 2 \times 25$
$= 50$

4. $\angle POR = (360° - 200°) \div 2$
$= 80°$

$x = 180 - 90 - 80$
$= 10$

$y = \sqrt{17^2 - 8^2}$
$= \sqrt{225}$
$= 15$

5. $x = 90$

$y = 360 - 90 - 90 - 50$
$= 130$

6. $x = 360 - 90 - 90 - 132$
$= 48$

$y = \dfrac{180 - 132}{2}$
$= 24$

B

1. (a) $OQ = \sqrt{13^2 - 12^2}$
$= \sqrt{25}$
$= 5$ cm

(b) kos $\angle OPQ = \dfrac{12}{13}$

$\angle OPQ = 22.62°$ atau $22° \, 37'$

2. (a) $\theta = 360° - 90° - 90° - 126°$
$= 54°$

(b) $\angle OPR = 54° \div 2$
$= 27°$

$\dfrac{OR}{PR} = \tan \angle OPR$

$\dfrac{OR}{8} = \tan 27°$

$OR = 8 \tan 27°$
$= 4.08$ cm

3. (a) $\tan \theta = \dfrac{40}{18}$

$\theta = 65.77°$ atau $65° \, 46'$

(b) $OQ = \sqrt{18^2 + 40^2}$
$= \sqrt{1\,924}$
$= 43.86$ cm

$QS = 43.86$ cm $- 18$ cm
$= 25.86$ cm

4. (a) $OS = \sqrt{20^2 - 16^2}$
$= \sqrt{144}$
$= 12$ cm

(b) kos $\angle OTS = \dfrac{16}{20}$

$\angle OTS = 36.87°$ atau $36° \, 52'$

$\angle RTS = 2 \times \angle OTS$
$= 2 \times 36.87°$
$= 73.74°$ atau $73° \, 44'$

8.2

A

1. (a) $\angle QUS$

(b) $\angle QSU$

2. (a) $\angle BED$

(b) $\angle BDE$

3. (a) $\angle QTS, \angle QUS$

(b) $\angle QSU$

B

1. $x = 80$

$y = 50$

2. $x = 66$

$y = 180 - 66 - 66$
$= 48$

3. $x = 25$

$y = 180 - 48 - 70$
$= 62$

4. $x = 68$

$y + 12 = 45$
$y = 45 - 12$
$= 33$

5. $x = 180 - 75$
$= 105$

$y = 180 - 52 - 105$
$= 23$

C

1. (a) $p = 50$

(b) $q = 20 + p$
$= 20 + 50$
$= 70$

2. (a) $p = 90 - 40$
$= 50$

(b) $q = 90 - 20$
$= 70$

3. (a) $x = \dfrac{180 - 50}{2}$
$= 65$

(b) $\angle BOE = 2 \times 65° = 130°$

$\angle OEB = \dfrac{180° - 130°}{2} = 25°$

$y + 25 = 60$ ← $\boxed{\angle BED = \angle CBD}$
$y = 35$

4. (a) $\angle FBD = 180° - 105°$
$= 75°$

$x = 180 - 75 - 30$
$= 75$

(b) $y + 30 = x$
$= 75$
$y = 45$

8.3

A

1.
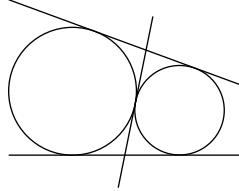
2.
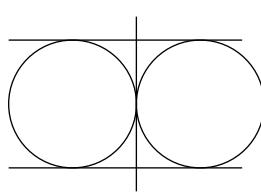
3.
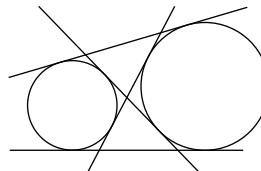
4.
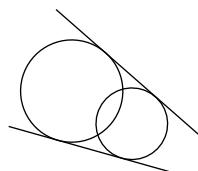
5.
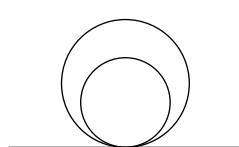
6.
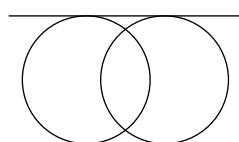
B

1. (a) *PQ, RS, TW, UV*

(b) *UV*

2. (a) *TPQ, TRS*

(b) $180°$

3. (a) *PMQT, RNST, MN*

(b) $\angle STB$

4. (a) *PQR*

(b) *BS*

5. (a) *PQT, RST*

(b) $\angle SBT$

C

1. (a) $\angle EPQ = 180° - 110°$
$= 70°$

$x = 2 \times 70$
$= 140$

(b) $PJ = \dfrac{20}{\tan 70°}$

$= 7.28$ cm

2. (a) $\angle VQR = \angle QSV = 55°$

$x = 180 - 70 - 55$
$= 55$

(b) $\angle QTU = \angle PQU = 70°$

$QST = \dfrac{8}{\cos 70°}$
$= 23.39$ cm

3. (a) $SR = \sqrt{(3+5)^2 - (5-3)^2}$

$= \sqrt{64 - 4}$

$= \sqrt{60}$

$= 7.75$ cm

(b) Luas trapezium $PQRS = \dfrac{1}{2} \times (3+5) \times 7.75$

$= 31$ cm^2

Praktis Formatif: Kertas 1

1. B
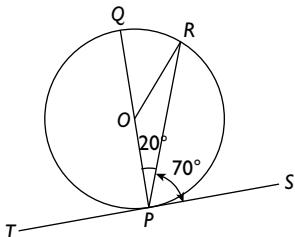
$\angle QPR = 90° - 70°$
$= 20°$
$\angle QOR = 2 \times 20°$
$= 40°$

2. A
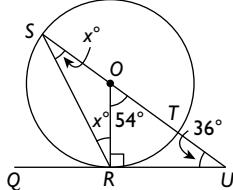
$\angle ROU = 180° - 90° - 36° = 54°$

$x = \dfrac{54}{2} = 27$

3. A

$\angle POQ = 2 \times 38°$
$= 76°$
$x° + 76° + 90° = 180°$
$x + 166 = 180$
$x = 14$

4. B
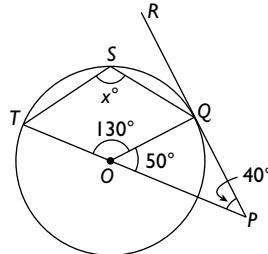
Sudut refleks $QOT = 360° - 130°$
$= 230°$

$x = \dfrac{1}{2} \times 230$
$= 115$

5. C
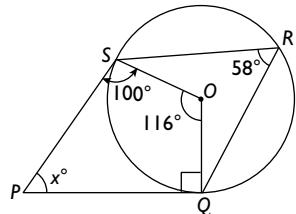
Dalam sisi empat $OQPS$,
$116° + 90° + x° + 100° = 360°$
$306 + x = 360$
$x = 54$

6. C

$\angle OPL = \angle OLP$
$= 90° - 64°$
$= 26°$
$\angle LOM = 26° + 26°$
$= 52°$

Dalam ΔLOM,
$90° + 52° + x° = 180°$
$142 + x = 180$
$x = 38$

7. C
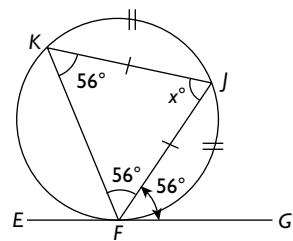
$x° + 56° + 56° = 180°$
$x + 112 = 180$
$x = 68$

8. A

$\angle TQR = \angle QST = 28°$

$28° + x° = 62°$
$\quad x = 62 - 28$
$\quad\quad = 34$

9. D
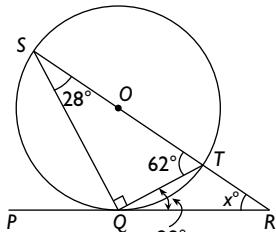
$\angle QST = \angle PQT = 52°$

$x° = 2 \times 52°$
$\;x = 104$

10. D

$\angle PQU = \angle QSU = 38°$

$\angle SQT = \angle SUT = 56°$

Pada garis lurus PQR,
$38° + 50° + 56° + x° = 180°$
$\quad\quad\quad\quad\quad 144 + x = 180$
$\quad\quad\quad\quad\quad\quad\quad\quad x = 36$
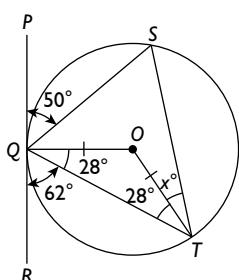
11. B

$\angle OQT = 90° - 62°$
$\quad\quad\quad = 28°$

$x° + 28° = 50°$
$\quad\quad x = 22$

12. D

$\angle SQT = \dfrac{180° - 48°}{2}$
$\quad\quad\quad = 66°$

$\angle TQR = 180° - 48 - 66°$
$\quad\quad\quad = 66°$

Dalam ΔQRT,
$x° + 66° + 38° = 180°$
$\quad\quad x + 104 = 180$
$\quad\quad\quad\quad x = 76$

13. C

$\angle PQT = \angle QUT$
$54° + x° = 82°$
$\quad\quad x = 82 - 54$
$\quad\quad\; = 28$

14. D

$\angle QPS = 180° - 140° = 40°$
$\angle PQS = \dfrac{180° - 40°}{2} = 70°$
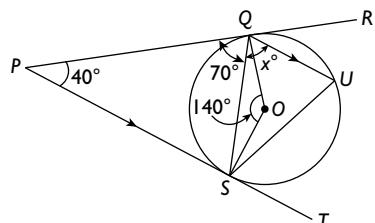
$\angle QPS + \angle PQU = 180°$
$40° + 70° + x° = 180°$
$\quad\quad 110 + x = 180$
$\quad\quad\quad\quad x = 70$

15. D

$x° = \angle UQR$
$\quad = 180° - 140°$
$\quad = 40°$
$\;x = 40$

$\angle PQM = 90° - 40° = 50°$

$\angle QPM = \angle PQM = 50°$

$y = 180 - 50 - 50$
$\quad = 80$

$\therefore\; x + y = 40 + 80$
$\quad\quad\quad\; = 120$

16. B

$\angle PQS = \angle TQR = 85°$

Sudut yang dicangkum oleh lengkok minor di pusat J
$= \angle PJS$
$= 180° - 85°$
$= 95°$
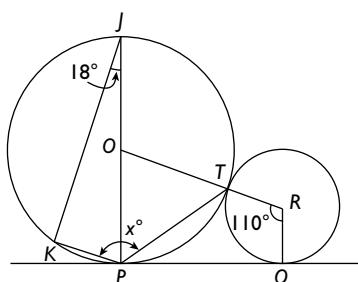
17. C

$\angle JPK = 180° - 90° - 18°$
$\quad\quad\quad = 72°$

$$\angle OPT = \frac{180° - 70°}{2}$$
$$= 55°$$

$x = 72 + 55$
$\quad = 127$

18. B

$\angle VRS + \angle VTS = 180°$
$100° + \angle VTS = 180°$
$\angle VTS = 80°$

Pada titik T,
$\angle QTU = 360° - 215° - 80°$
$\quad\quad\quad = 65°$

$x° = \angle QTU$
$\ x = 65$

JAWAPAN

BAB 9: TRIGONOMETRI II

9.1

A

1. (a) sin 66° = 0.9135

   (b) kos 66° = 0.4067

   (c) $\tan 66° = \dfrac{0.9135}{0.4067} = 2.2461$

2. (a) sin 234° = −0.8090

   (b) kos 234° = −0.5878

   (c) $\tan 234° = \dfrac{-0.8090}{-0.5878} = 1.3763$

3. (a) sin 311° = −0.7547

   (b) kos 311° = 0.6560

   (c) $\tan 311° = \dfrac{-0.7547}{0.6560} = -1.150$

B

	Sudut *Angle*	Sukuan *Quadrant*	Nilai *Value*
1.	sin 75°	I	Positif
2.	sin 280°	IV	Negatif
3.	sin 205°	III	Negatif
4.	kos 100° *cos 100°*	II	Negatif
5.	kos 35° *cos 35°*	I	Positif
6.	kos 330° *cos 330°*	IV	Positif
7.	kos 200° *cos 200°*	III	Negatif
8.	tan 195°	III	Positif
9.	tan 47°	I	Positif
10.	tan 320°	IV	Negatif

C

θ	0°	30°	45°	60°	90°	180°	270°	360°
sin θ	0	$\dfrac{1}{2}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{\sqrt{3}}{2}$	1	0	−1	0
kos θ *cos θ*	1	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{1}{2}$	0	−1	0	1
tan θ	0	$\dfrac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Tak tertakrif *Undefined*	0	Tak tertakrif *Undefined*	0

D

	Sukuan I *Quadrant I*	Sukuan II *Quadrant II*	Sukuan III *Quadrant III*	Sukuan IV *Quadrant IV*
1.	50°	130°	230°	310°
2.	75°	105°	255°	285°
3.	18°	162°	198°	342°
4.	25°	155°	205°	335°

E

1. sin 212° ← Sukuan III

α = 212° – 180°
   = 32°

sin 212° = –sin 32°
         = –0.5299

2. kos 110° ← Sukuan II
   cos 110°

α = 180° – 110°
   = 70°

kos 110° = –kos 70°
         = –0.3420

3. tan 325° ← Sukuan IV

α = 360° – 325°
   = 35°

tan 325° = –tan 35°
         = –0.7002

4. sin 315° ← Sukuan IV

α = 360° – 315°
   = 45°

sin 315° = –sin 45°
         = –0.7071

5. tan 190.5° ← Sukuan III

α = 190.5° – 180°
   = 10.5°

tan 190.5° = tan 10.5°
           = 0.1853

6. kos 263° 18′ ← Sukuan III
   cos 263° 18′

α = 263° 18′ – 180°
   = 83° 18′

kos 263° 18′ = –kos 83° 18′
             = –0.1167

F

1. sin θ = 0.7071

sin 45° = 0.7071

∴ θ = 45° atau θ = 180° – 45°
                         = 135°

2. sin θ = 0.4808

sin 28° 44′ = 0.4808

∴ θ = 28° 44′ atau θ = 180° – 28° 44′
                             = 151° 16′

3. sin θ = –0.8660

sin 60° = 0.8660

∴ θ = 180° + 60° atau θ = 360° – 60°
   = 240°   = 300°

4. sin θ = –0.8426

sin 57° 25′ = 0.8426

∴ θ = 180° + 57° 25′ atau θ = 360° – 57° 25′
   = 237° 25′   = 302° 35′

5. kos θ = 0.1736/*cos θ = 0.1736*

kos 80° = 0.1736

∴ θ = 80° atau θ = 360° – 80°
                         = 280°

6. kos θ = 0.7744/*cos θ = 0.7744*

kos 39° 15′ = 0.7744

∴ θ = 39° 15′ atau θ = 360° – 39° 15′
                             = 320° 45′

7. kos θ = –0.5/*cos θ = –0.5*

kos 60° = 0.5

∴ θ = 180° – 60° atau θ = 180° + 60°
   = 120°   = 240°

8. kos θ = –0.3275/*cos θ = –0.3275*

kos 70° 53′ = 0.3275

∴ θ = 180° – 70° 53′ atau θ = 180° + 70° 53′
   = 109° 7′   = 250° 53′

9. tan θ = 3.487

tan 74° = 3.487

∴ θ = 74° atau θ = 180° + 74°
                         = 254°

10. tan θ = 1.483

tan 56° = 1.483

∴ θ = 56° atau θ = 180° + 56°
                         = 236°

11. tan θ = –0.5774

tan 30° = 0.5774

∴ θ = 180° – 30° atau θ = 360° – 30°
   = 150°   = 330°

12. $\tan \theta = -6.041$

$\tan 80° \, 36' = 6.041$

$\therefore \theta = 180° - 80° \, 36'$ atau $\theta = 360° - 80° \, 36'$
$\quad\quad = 99° \, 24'$ $\quad\quad\quad\quad\quad = 279° \, 24'$

G

1. (a) $PQ = \sqrt{17^2 - 8^2}$
$\quad\quad\quad = 15$ cm

$\sin x° = \dfrac{PQ}{PR}$

$\quad\quad = \dfrac{15}{17}$

(b) $QS = 8 + 12$
$\quad\quad = 20$ cm

$\tan y° = -\tan \angle PSQ$

$\quad\quad = -\dfrac{PQ}{QS}$

$\quad\quad = -\dfrac{15}{20}$

$\quad\quad = -\dfrac{3}{4}$

2. (a) $AC = \sqrt{10^2 - 6^2} = 8$ cm

$\dfrac{BC}{AC} = \dfrac{3}{4}$

$BC = \dfrac{3}{4} \times 8$ cm

$\quad\quad = 6$ cm

$\therefore \tan \alpha = \dfrac{BC}{CD}$

$\quad\quad\quad = \dfrac{6}{12}$

$\quad\quad\quad = \dfrac{1}{2}$

(b) $\text{kos } \beta = -\text{kos } \angle AEC$

$\quad\quad\quad = -\dfrac{6}{10}$

$\quad\quad\quad = -\dfrac{3}{5}$

3. (a) $AE = \sqrt{6^2 + 8^2}$
$\quad\quad\quad = 10$ m

$\text{kos } \angle BAE = \dfrac{AB}{AE}$

$\quad\quad\quad\quad = \dfrac{6}{10}$

$\quad\quad\quad\quad = \dfrac{3}{5}$

(b) $BF = 8$ m $\div 2$
$\quad\quad = 4$ m

$-\tan \angle BCF = \tan \angle DCF = -\dfrac{1}{2}$

$\quad\quad\quad \dfrac{BF}{BC} = \dfrac{1}{2}$

$\quad\quad\quad \dfrac{4}{BC} = \dfrac{1}{2}$

$\quad\quad\quad BC = 4 \times 2$

$\quad\quad\quad\quad\quad = 8$ m

9.2

A

1. $y = \sin \theta, \quad 0° \leq \theta \leq 360°$

θ	$y = \sin \theta$
0°	0
30°	0.5
90°	1
150°	0.5
180°	0
210°	−0.5
270°	−1
330°	−0.5
360°	0

2. $y = \text{kos } \theta / y = \cos \theta$, $\quad 0° \leq \theta \leq 360°$
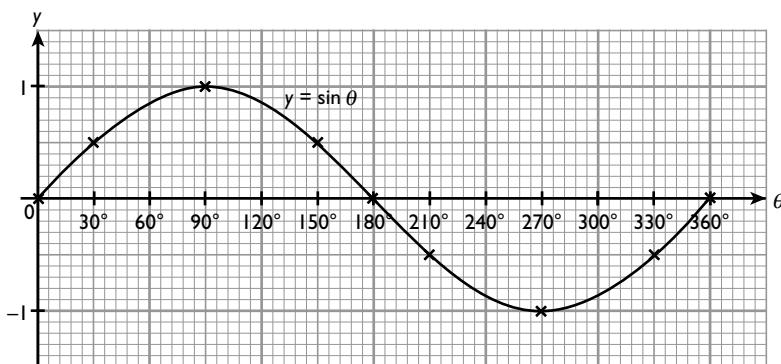
θ	$y = \text{kos } \theta / y = \cos \theta$
0°	1
60°	0.5
90°	0
120°	−0.5
180°	−1
240°	−0.5
270°	0
300°	0.5
360°	1
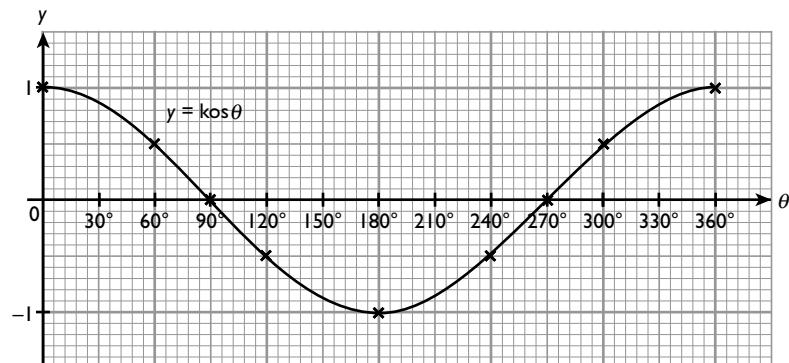
3. $y = \tan \theta$, $\quad 0° \leq \theta \leq 360°$

θ	$y = \tan \theta$
0°	0
45°	1
90°	Tak tertakrif/*Undefined*
135°	−1
180°	0
225°	1
270°	Tak tertakrif/*Undefined*
315°	−1
360°	0
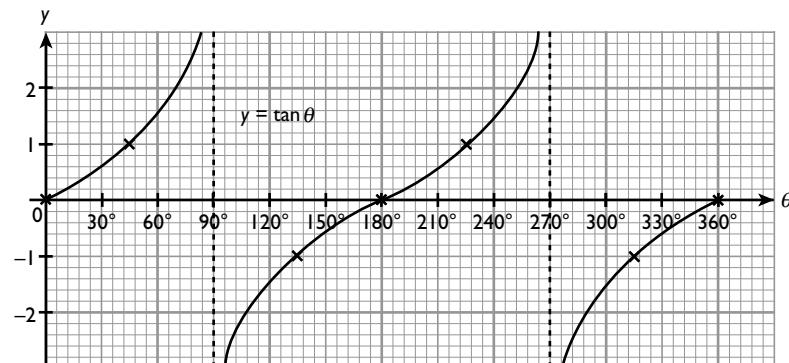
B

1. $\theta = 90°, 270°$

2. $\theta = 0°, 180°, 360°$

3. $\theta = 90°$

4. $\theta = 0°, 360°$

5. $\theta = 45°, 225°$

6. $\theta = 270°$

7. $\theta = 180°$

8. $\theta = 45°, 225°$

Praktis Formatif: Kertas 1

1. **A**

kos $x° = $ Koordinat-x bagi titik P
    $= -0.7660$

2. **D**

$\tan \theta = \dfrac{\text{Koordinat-}y}{\text{Koordinat-}x}$

$= \dfrac{0.7431}{0.6691}$

$= 1.1106$

3. **D**

sin θ = Koordinat-y bagi titik R
        $= -0.8116$
Nilai sudut dalam sukuan I yang sepadan dengan θ
$= \sin^{-1} 0.8116$
$= 54° \, 15'$
$\theta = 180° + 54° \, 15'$
   $= 234° \, 15'$ (Sukuan III)

Kaedah Alternatif:
kos θ = Koordinat-x bagi titik R
        $= -0.5842$
Nilai sudut dalam sukuan I yang sepadan dengan θ
$= \text{kos}^{-1} 0.5842$
$= 54° \, 15'$
$\theta = 180° + 54° \, 15'$
   $= 234° \, 15'$ (Sukuan III)

4. A
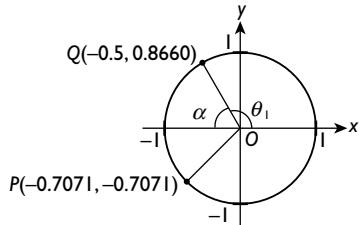
Nilai sudut dalam sukuan I yang sepadan dengan θ_1
$= \alpha$
$= \sin^{-1} 0.8660$
$= 60°$
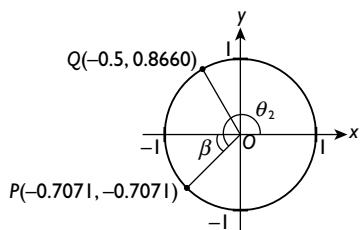
Nilai sudut dalam sukuan I yang sepadan dengan θ_2
$= \beta$
$= \sin^{-1} 0.7071$
$= 45°$

Nilai sudut bagi sektor minor POQ
$= \alpha + \beta$
$= 60° + 45°$
$= 105°$

5. A

$\sin \alpha + \kos \beta = $ Koordinat-y bagi titik P
$\qquad\qquad\quad + $ Koordinat-x bagi titik Q
$\qquad\qquad = 0.34 + 0.60$
$\qquad\qquad = 0.94$

6. D

$\kos \theta = -\dfrac{5}{13}$, $180° \leq \theta \leq 360°$

$\kos \theta$ bernilai negatif dalam sukuan IV.

$\therefore \theta$ terletak dalam sukuan IV.
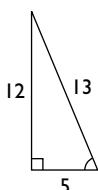
$\tan \theta$ bernilai positif dalam sukuan IV.
$\therefore \tan \theta = \dfrac{12}{5}$

7. B

$\tan \theta = 0.5774$ dan $0° \leq \theta \leq 360°$
$\tan \theta$ bernilai positif dalam sukuan I dan III.

$\tan 30° = 0.5774$

$\therefore \theta = 30°$ atau $\theta = 180° + 30°$
$\qquad\qquad\qquad\qquad = 210°$

8. B

$\kos \theta = -0.9013$ dan $180° \leq \theta \leq 360°$.
$\kos \theta$ bernilai negatif dalam sukuan III.

$\kos 25° 40' = 0.9013$

$\therefore \theta = 180° + 25° 40'$
$\qquad = 205° 40'$

9. B
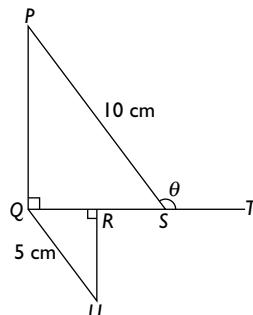
$\sin \angle RQU = \dfrac{4}{5}$

$QR = \sqrt{5^2 - 4^2}$
$\quad\;\; = 3$ cm

$QS = 2 \times 3$ cm
$\quad\;\; = 6$ cm

$PQ = \sqrt{10^2 - 6^2}$
$\quad\;\; = 8$ cm

$\tan \theta = -\tan \angle PSQ$

$\qquad = -\dfrac{PQ}{QS}$

$\qquad = -\dfrac{8}{6}$

$\qquad = -\dfrac{4}{3}$

10. B

$\sin x° = \dfrac{5}{13}$

$TU = \sqrt{13^2 - 5^2}$

$\quad\;\; = 12$ unit

$\tan y° = -\tan x°$

$\qquad = -\dfrac{UV}{TU}$

$\qquad = -\dfrac{5}{12}$

11. D

$$\sin x° = \frac{4}{5}$$

$$PS = \frac{4}{5} \times 15 \text{ cm}$$
$$= 12 \text{ cm}$$

$$ST = \sqrt{15^2 - 12^2}$$
$$= 9 \text{ cm}$$

$$QS = \frac{1}{2} \times 12 \text{ cm}$$
$$= 6 \text{ cm}$$

$$\tan 18° = \frac{6}{RS}$$
$$RS = \frac{6}{\tan 18°}$$
$$= 18.47 \text{ cm}$$

$$\therefore RST = RS + ST$$
$$= 18.47 + 9$$
$$= 27.47 \text{ cm}$$

12. A

$$PR = 2 \times 6 \text{ cm}$$
$$= 12 \text{ cm}$$

$$PS = \sqrt{9^2 + 12^2}$$
$$= 15 \text{ cm}$$

$$\text{kos } x° = -\text{kos } \angle RPS$$
$$= -\frac{PR}{PS}$$
$$= -\frac{12}{15}$$
$$= -\frac{4}{5}$$

13. C
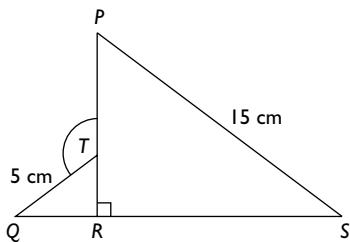
$$RS = \frac{4}{5} \times 15 \text{ cm}$$
$$= 12 \text{ cm}$$

$$PR = \sqrt{15^2 - 12^2}$$
$$= 9 \text{ cm}$$

$$\text{kos } \angle PTQ = -\frac{3}{5}$$
$$TR = 3 \text{ cm}$$

$$\therefore PT = 9 - 3$$
$$= 6 \text{ cm}$$

14. C
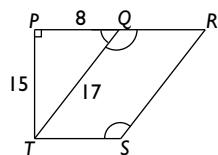
$$PQ = \sqrt{17^2 - 15^2}$$
$$= 8 \text{ unit}$$

$$\text{kos } \angle RST = \text{kos } \angle RQT$$
$$= -\text{kos } \angle PQT$$
$$= -\frac{PQ}{QT}$$
$$= -\frac{8}{17}$$

15. C
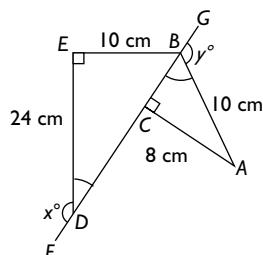
$$\tan x° = -\tan \angle BDE$$
$$= -\frac{5}{12}$$

$$DE = \frac{12}{5} \times 10 \text{ cm}$$
$$= 24 \text{ cm}$$

$$BD = \sqrt{10^2 + 24^2}$$
$$= 26 \text{ cm}$$

$$BC = 26 - 20$$
$$= 6 \text{ cm}$$

$$AB = \sqrt{6^2 + 8^2}$$
$$= 10 \text{ cm}$$

$$\sin y° = \sin \angle ABC$$
$$= \frac{AC}{AB}$$
$$= \frac{8}{10}$$
$$= \frac{4}{5}$$

16. A
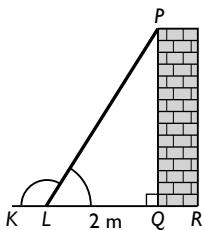
$$LP = \frac{17}{8} \times 2 \text{ m}$$
$$= 4.25 \text{ m}$$

$$PQ = \sqrt{4.25^2 - 2^2}$$
$$= 3.75 \text{ m}$$

17. C

$y = \text{kos } x \ (0° \leq x \leq 360°)$
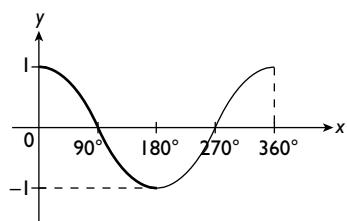
∴ Graf **C** mewakili sebahagian daripada $y = \text{kos } x$.

18. D
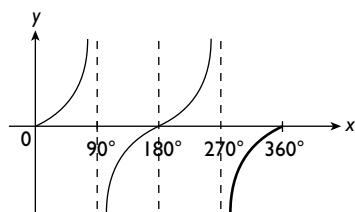
$y = \tan x \ (0° \leq x \leq 360°)$

∴ Graf **D** mewakili sebahagian daripada $y = \tan x$.

19. B

$y = \sin x \ (0° \leq x \leq 360°)$
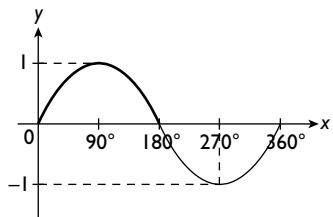
20. D
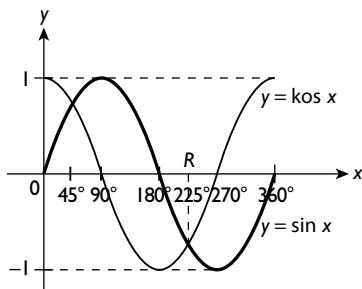
∴ $R = 225°$

21. C
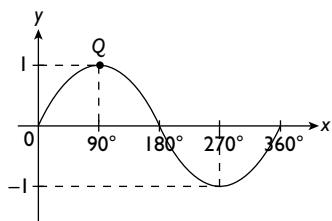
Koordinat titik $Q = (90°, 1)$

22. B

Daripada graf, $\text{kos } Q = 0.9063$
$$Q = 25°$$

∴ $\sin Q = \sin 25°$
$$= 0.4226$$

BAB 10: SUDUT DONGAKAN DAN SUDUT TUNDUK

10.1

A

1. (a) $\angle PRS$ atau $\angle SRP$

   (b) $\angle QPR$ atau $\angle RPQ$

2. (a) $\angle NPQ$ atau $\angle QPN$

   (b) $\angle MNP$ atau $\angle PNM$

3. (a) $\angle BDC$ atau $\angle CDB$

   (b) $\angle BAC$ atau $\angle CAB$

4. (a) $\angle ABC$ atau $\angle CBA$

   (b) $\angle CBE$ atau $\angle EBC$

5. (a) $\angle BJK$ atau $\angle KJB$

   (b) $\angle CDJ$ atau $\angle JDC$

B (Terima jawapan lain yang munasabah)

1.
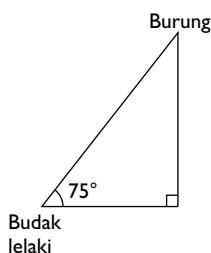
2.
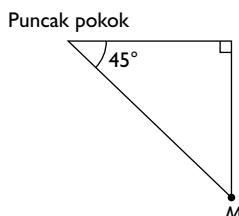
3.
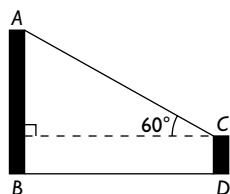
C

1. $\dfrac{8}{ST} = \tan 70°$

   $ST = \dfrac{8}{\tan 70°}$

   $\quad = 2.912$ m

   $\dfrac{8}{RT} = \tan 40°$

   $RT = \dfrac{8}{\tan 40°}$

   $\quad = 9.534$ m

   $\therefore$ Jarak $RS = 9.534 - 2.912$

   $\qquad\qquad = 6.622$ m

2. Katakan tinggi aras mata penyelamat dari tanah mengufuk = x.
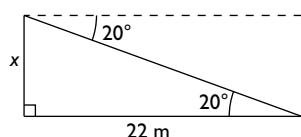
   $\tan 20° = \dfrac{x}{22}$

   $\quad\quad x = 22 \tan 20°$

   $\quad\quad\quad = 8$ m

3. $\dfrac{8}{QS} = \tan 74°$

   $QS = \dfrac{8}{\tan 74°}$

   $\quad\ = 2.294$ m

   $\dfrac{8 - 3}{SU} = \tan 42°$

   $\quad SU = \dfrac{5}{\tan 42°}$

   $\qquad = 5.553$ m

   $\therefore$ Jarak $QU = 2.294 + 5.553$

   $\qquad\qquad = 7.847$ m

4.
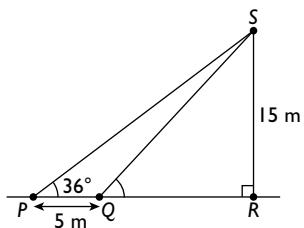
$$\tan 36° = \frac{15}{5 + QR}$$

$$5 + QR = \frac{15}{\tan 36°}$$

$$= 20.65 \text{ m}$$

$$QR = 15.65 \text{ m}$$

Sudut tunduk Q dari $S = \angle SQR$

$$\tan \angle SQR = \frac{15}{15.65}$$

$$\angle SQR = 43.79° \text{ atau } 43° 47'$$

Praktis Formatif: Kertas 1

1. B
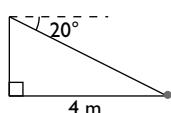
2. A
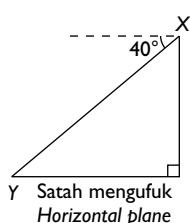
3. D
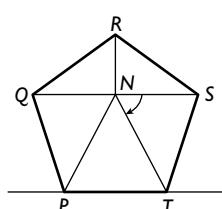
Sudut tunduk dari titik $N = \angle SNT$

4. D

   A Sudut dongakan bagi titik Q dari titik U ialah $\angle QUS$. (Bukan $\angle RUS$)

   B Sudut dongakan bagi titik T dari titik S ialah $\angle TSU$. (Bukan $\angle STU$)

   C Sudut tunduk bagi titik S dari titik T ialah $\angle RTS$. (Bukan $\angle RST$)

   D Sudut tunduk bagi titik U dari titik R ialah $\angle TRU$. (Benar)

5. C

   A $q°$ ialah sudut tunduk Mary dari burung. (Bukan $p°$)

   B $p°$ ialah sudut dongakan burung dari Mary. (Bukan $q°$)

   C $x°$ ialah sudut tunduk Mary dari kapal terbang. (Benar)

   D $y°$ ialah sudut dongakan kapal terbang dari Mary.

6. A
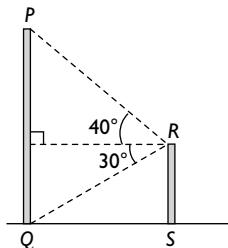
7. A

Sudut dongakan titik L dari titik $J = \angle KJL$

$$\tan \angle KJL = \frac{6}{8}$$

$$\angle KJL = 36° 52'$$

8. B

Tinggi tiang = HK

$$\tan 38° = \frac{HK}{45}$$

$$HK = 45 \tan 38°$$

$$= 35.16 \text{ m}$$

9. C
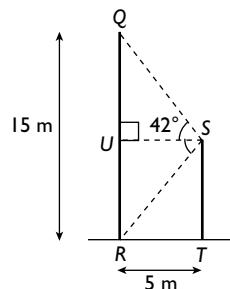
$$\tan 42° = \frac{QU}{5}$$

$$QU = 5 \tan 42°$$

$$= 4.5 \text{ m}$$

$$RU = 15 - 4.5$$

$$= 10.5 \text{ m}$$

Sudut tunduk R dari $S = \angle USR$

$$\tan \angle USR = \frac{10.5}{5}$$

$$\angle USR = 64° 32'$$

10. D
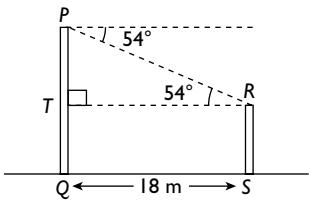
$\tan 54° = \dfrac{PT}{18}$

$\quad PT = 18 \tan 54°$

$\qquad = 24.775 \text{ m}$

$PQ = 2 \times 24.775 \text{ m}$

$\quad = 49.55 \text{ m}$

11. D
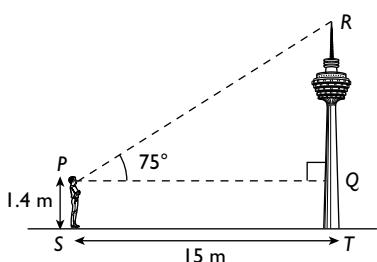
Katakan tinggi menara = RT.

$\tan 75° = \dfrac{QR}{15}$

$\quad QR = 15 \tan 75°$

$\qquad = 55.98 \text{ m}$

$RT = 55.98 + 1.4$

$\quad = 57.38 \text{ m}$

12. B

Kedalaman air = PQ

$\tan 23° \, 18' = \dfrac{PQ}{5}$

$\qquad PQ = 5 \tan 23° \, 18'$

$\qquad\quad = 2.15 \text{ m}$

13. A
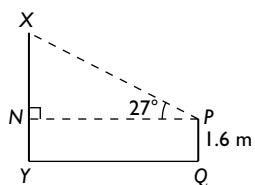
$\tan 27° = \dfrac{NX}{8}$

$\quad NX = 8 \tan 27°$

$\qquad = 4.1 \text{ m}$

$XY = 4.1 + 1.6$

$\quad = 5.7 \text{ m}$

14. B

$\text{kos } 32° = \dfrac{1.92}{\text{Panjang minimum tali}}$

$\text{Panjang minimum tali} = \dfrac{1.92}{\text{kos } 32°}$

$\qquad\qquad\qquad\quad = 2.26 \text{ m}$

15. A

Tinggi rak buku $A = 3 \times 0.25 \text{ m}$

$\qquad\qquad\quad = 0.75 \text{ m}$

Tinggi rak buku $B = 5 \times 0.36 \text{ m}$

$\qquad\qquad\quad = 1.8 \text{ m}$
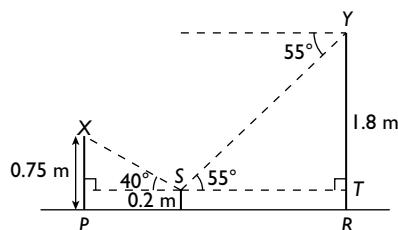
$\tan 40° = \dfrac{0.75 - 0.2}{PS}$

$\quad PS = \dfrac{0.55}{\tan 40°}$

$\qquad = 0.66 \text{ m}$

$\tan 55° = \dfrac{1.8 - 0.2}{ST}$

$\quad ST = \dfrac{1.6}{\tan 55°}$

$\qquad = 1.12 \text{ m}$

Jarak di antara dua rak buku $= 0.66 + 1.12$

$\qquad\qquad\qquad\qquad\quad = 1.78 \text{ m}$

16. D
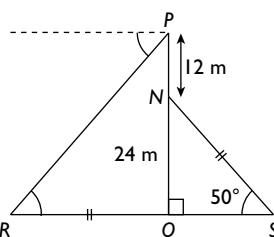
$\sin 50° = \dfrac{24}{NS}$

$\quad NS = \dfrac{24}{\sin 50°}$

$\qquad = 31.33 \text{ m}$

$RQ = NS = 31.33 \text{ m}$

Sudut tunduk titik R dari titik $P = \angle PRQ$

$\tan \angle PRQ = \dfrac{12 + 24}{31.33}$

$\qquad\qquad = \dfrac{36}{31.33}$

$\quad \angle PRQ = 48.97°$

BAB 11: GARIS DAN SATAH DALAM TIGA DIMENSI

11.1

A

1. (a) *JQ, KR, LS, MP*

   (b) *JK, ML, PS, QR*

2. (a) *AF, DE*

   (b) *AB, DC*

B

1. (a) *BD*   (b) *AE*

2. (a) *OC*   (b) *VO*

3. (a) *QN*   (b) *MU*

C

1. (a) ∠*CAG* atau ∠*GAC*

   (b) ∠*HAG* atau ∠*GAH*

2. (a) ∠*LJQ* atau ∠*QJL*

   (b) ∠*LQM* atau ∠*MQL*

3. (a) ∠*SQT* atau ∠*TQS*

   (b) ∠*PTQ* atau ∠*QTP*

4. (a) ∠*ECO* atau ∠*OCE*

   (b) ∠*EGO* atau ∠*OGE*

5. (a) ∠*DME* atau ∠*EMD*

   (b) ∠*AEM* atau ∠*MEA*

6. (a) ∠*ABE* atau ∠*EBA*

   (b) ∠*HCE* atau ∠*ECH*

D

1. (a) ∠*BHC* atau ∠*CHB*

   (b)
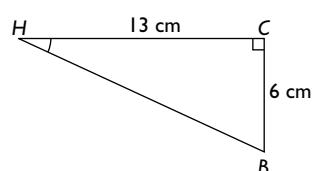
$$HC = \sqrt{5^2 + 12^2}$$
$$= \sqrt{169}$$
$$= 13 \text{ cm}$$

$$\tan \angle BHC = \frac{6}{13}$$
$$\angle BHC = 24.78° \text{ atau } 24° \, 47'$$

2. (a) ∠*PQS* atau ∠*SQP*

   (b)
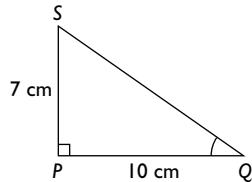
$$\tan \angle PQS = \frac{7}{10}$$
$$\angle PQS = 35°$$

3. (a) ∠*EBN* atau ∠*NBE*

   (b) $BD = \sqrt{9^2 + 12^2}$
   $$= \sqrt{225}$$
   $$= 15 \text{ cm}$$

   $$BN = \frac{1}{2}BD$$
   $$= \frac{1}{2} \times 15 \text{ cm}$$
   $$= 7.5 \text{ cm}$$

$$\text{kos } \angle EBN = \frac{7.5}{15}$$
$$= 0.5$$
$$\angle EBN = 60°$$
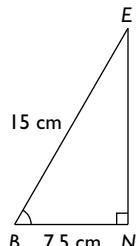
11.2

A

1. (a) ∠*FDA* atau ∠*GCB*

   (b) ∠*FDE* atau ∠*GCH*

2. (a) ∠*HAD* atau ∠*DAH*

   (b) ∠*HAE* atau ∠*EAH*

3. (a) ∠*QUP* atau ∠*PUQ*

   (b) ∠*QUV* atau ∠*VUQ*

4. (a) $\angle VRU$ atau $\angle URV$

   (b) $\angle RUT$ atau $\angle TUR$

5. (a) $\angle FMN$ atau $\angle NMF$

   (b) $\angle EMF$ atau $\angle FME$

6. (a) $\angle VNM$ atau $\angle MNV$

   (b) $\angle NVM$ atau $\angle MVN$

B

1. (a) $\angle TPU$ atau $\angle UPT$

   (b)
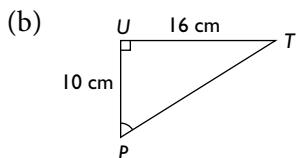
$$\tan \angle TPU = \frac{16}{10}$$
$$= 1.6$$
$$\angle TPU = 58°$$

2. (a) $\angle MCD$ atau $\angle DCM$

   (b) $MD = 8 \text{ cm} \div 2 = 4 \text{ cm}$
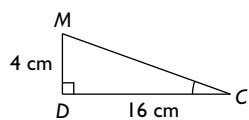
$$\tan \angle MCD = \frac{4}{16}$$
$$\angle MCD = 14.04° \text{ atau } 14° \, 2'$$

3. (a) $\angle BFA$ atau $\angle AFB$

   (b) $NB = \sqrt{10^2 - 8^2} = 6 \text{ cm}$
$$AB = 5 + 6$$
$$= 11 \text{ cm}$$
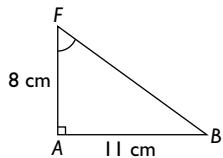
$$\tan \angle BFA = \frac{11}{8}$$
$$\angle BFA = 53.97° \text{ atau } 53° \, 58'$$

Praktis Formatif: Kertas 1

1. A
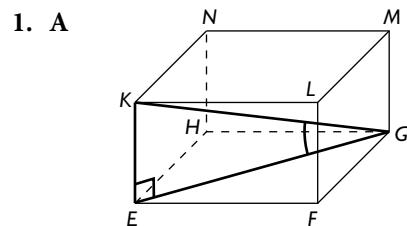
Sudut di antara garis GK dengan tapak $EFGH$ = $\angle EGK$

2. B
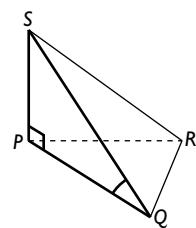
Sudut di antara garis QS dengan tapak PQR = $\angle PQS$

3. D
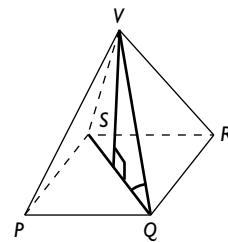
Sudut di antara garis QV dengan tapak $PQRS$ = $\angle VQS$

4. B
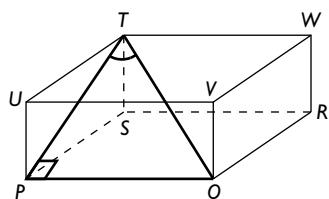
Sudut di antara garis QT dengan satah $PSTU$ = $\angle QTP$

5. A
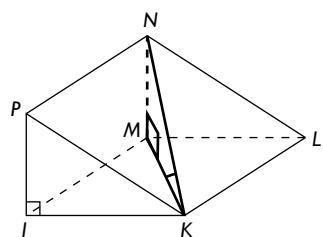
Sudut di antara garis KN dengan tapak $JKLM$ = $\angle NKM$

6. B
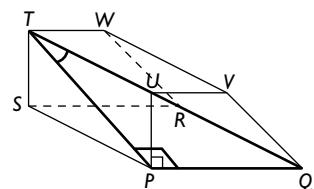
Sudut di antara garis QT dengan satah **X** ialah $\angle PTQ$.

Maka, satah **X** ialah satah $PSTU$.

7. D
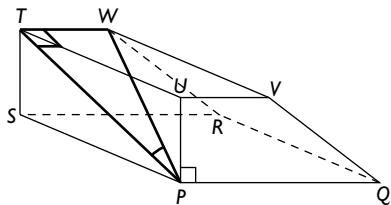
Sudut di antara garis lurus *PW* dan satah *PSTU* = ∠*TPW*

8. A
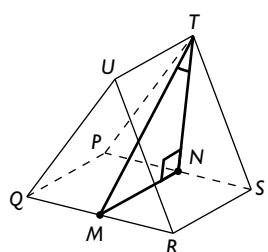
Sudut di antara garis *MT* dengan satah *PST* = ∠*MTN*

9. C
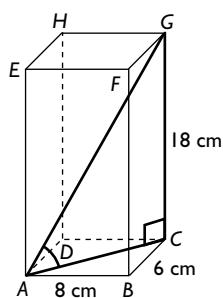
Sudut di antara garis *AG* dengan tapak *ABCD* = ∠*CAG* atau ∠*GAC*

$$AC = \sqrt{6^2 + 8^2}$$
$$= \sqrt{100}$$
$$= 10 \text{ cm}$$
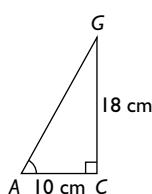
$$\tan \angle CAG = \frac{18}{10}$$
$$= 1.8$$
$$\angle CAG = 60° \, 57'$$

10. C
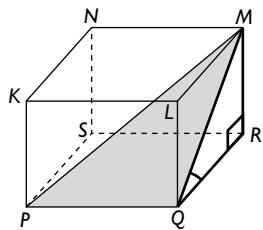
Sudut di antara satah *MPQ* dengan tapak *PQRS* = ∠*MQR*

11. A
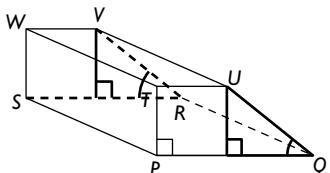
Sudut di antara satah *QRVU* dengan tapak *PQRS* = ∠*SRV*

12. A
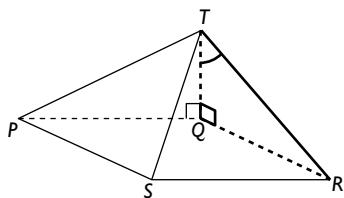
Sudut di antara satah *PQT* dengan satah *RST* = ∠*QTR*

13. C
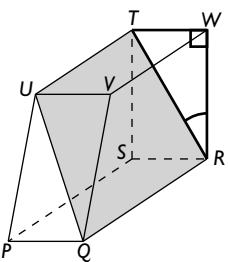
Sudut di antara satah *QRTU* dengan satah *QRWV* = ∠*TRW*

14. B
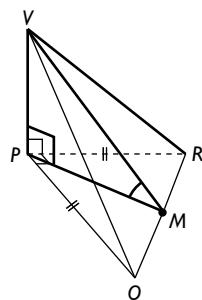
Sudut di antara satah *VQR* dengan tapak *PQR* = ∠*VMP*

15. **B**
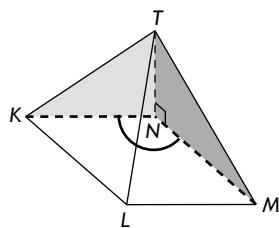
Sudut di antara satah *MNT* dengan satah *KNT* = ∠*MNK*

16. **A**
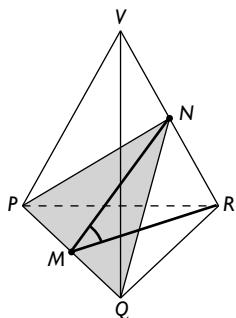
Sudut di antara satah *NPQ* dengan tapak *PQR* = ∠*NMR*

17. **C**
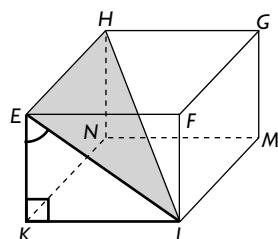
Sudut di antara satah *EHL* dengan satah *EHNK* = ∠*KEL*

18. **A**
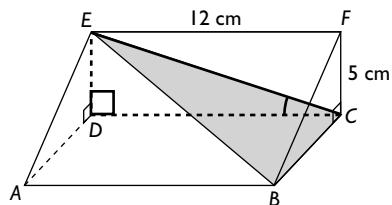
Sudut di antara satah *BCE* dengan tapak *ABCD* = ∠*ECD* atau ∠*DCE*
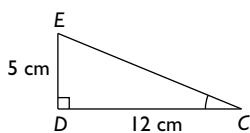
$\tan \angle ECD = \dfrac{5}{12}$

$\angle ECD = 22° \, 37'$

1. (a) ∠*PRU* atau ∠*URP*

 (b) $PR = \sqrt{6^2 + 8^2}$

  $= 10$ cm
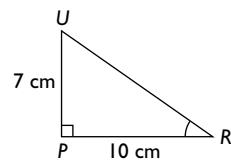
$\tan \angle PRU = \dfrac{7}{10}$

  $\angle PRU = 35°$

∴ Sudut di antara garis *RU* dengan tapak *PQRS* = 35°

2. (a) ∠*QWV* atau ∠*VWQ*

 (b)
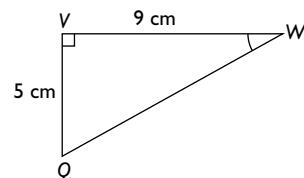
$\tan \angle QWV = \dfrac{5}{9}$

  $\angle QWV = 29.05°$ atau 29° 3′

∴ Sudut di antara garis *QW* dengan satah *TUVW* = 29.05° atau 29° 3′

3. (a)
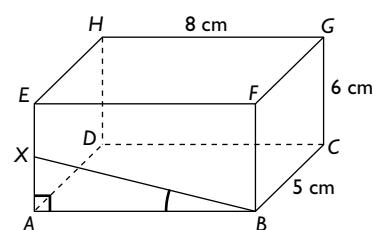
 (b) $XA = 6$ cm $\div 2$

  $= 3$ cm
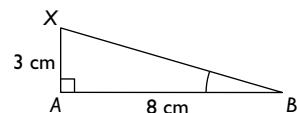
$\tan \angle XBA = \dfrac{3}{8}$

  $\angle XBA = 20.56°$ atau 20° 33′

∴ Sudut di antara garis *XB* dengan tapak *ABCD* = 20.56° atau 20° 33′

4. (a)
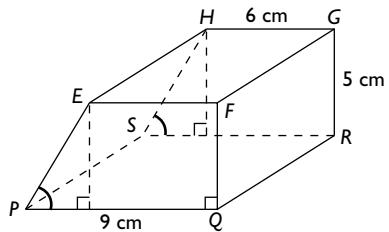
(b)
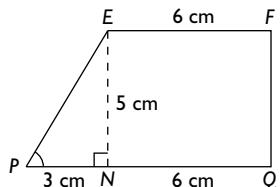
$PN = 9 - 6$
$\quad\ = 3$ cm

$\tan \angle EPN = \dfrac{5}{3}$

$\quad \angle EPN = 59.04°$ atau $59° \ 2'$

∴ Sudut di antara satah *EPSH* dengan tapak *PQRS* = 59.04° atau 59° 2′

5. (a)
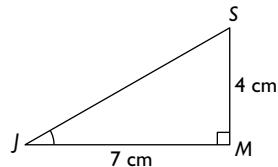
$\tan \angle SJM = \dfrac{4}{7}$

$\quad \angle SJM = 29.74°$ atau $29° \ 45'$

∴ Sudut di antara kad berwarna *JNRS* dengan tapak kotak itu
$= \angle SJM$ atau $\angle MJS$
$= 29.74°$ atau $29° \ 45'$

6. (a) $\angle UPS$ atau $\angle TQR$

(b)
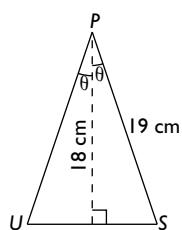
$\text{kos } \theta = \dfrac{18}{19}$

$\quad \theta = 18.67°$ atau $18° \ 40'$

$\angle UPS = 2\theta$
$\quad\quad\quad = 37.34°$ atau $37° \ 20'$

7. (a) $\angle DAE$ atau $\angle CBF$ atau setara

(b)
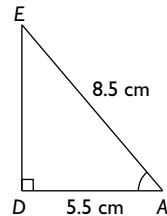
$\text{kos } \angle DAE = \dfrac{5.5}{8.5}$

$\quad \angle DAE = 49.68°$ atau $49° \ 41'$

FOKUS KBAT

(a)
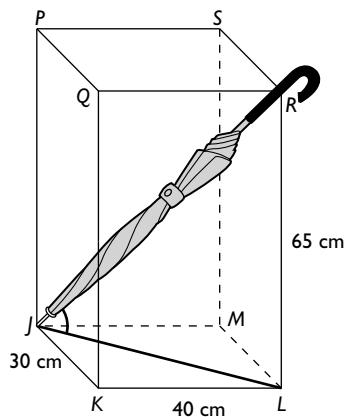
(b) Sudut di antara payung itu dengan tapak *JKLM*
$= \angle RJL$
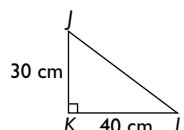
Dalam $\triangle JKL$,
$JL = \sqrt{30^2 + 40^2}$
$\quad\ = 50$ cm
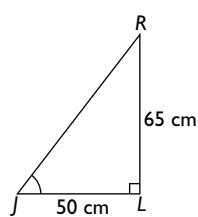
Dalam $\triangle RJL$,

$\tan \angle RJL = \dfrac{65}{50}$

$\quad \angle RJL = 52.43°$ atau $52° \ 26'$

∴ Sudut di antara payung itu dengan tapak *JKLM* = 52.43° atau 52° 26′

JAWAPAN

PRAKTIS AWAL SPM

1. C

$$50° + x° + 65° = 180°$$
$$x + 115 = 180$$
$$x = 65$$
$$y° + 86° = 180°$$
$$y = 94$$

2. B

$$x° + y° + y° + (360° – 45°) + y° + 2x° = 720°$$
$$3x + 3y + 315 = 720$$
$$3(x + y) = 405$$
$$x + y = 135$$

3. A

> Sudut pedalaman sebuah oktagon sekata = 135°.
> Sudut pedalaman sebuah pentagon sekata = 108°.

$$y = 135 – 108$$
$$= 27$$

4. C

$$\angle TUV = 180° – 120°$$
$$= 60°$$

$$x° + 60° = 135°$$
$$x = 75$$

5. B
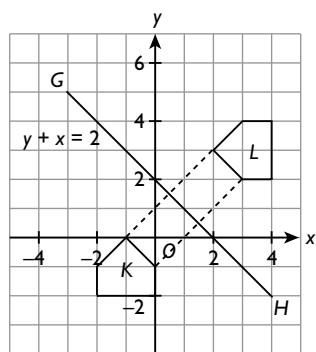
6. C
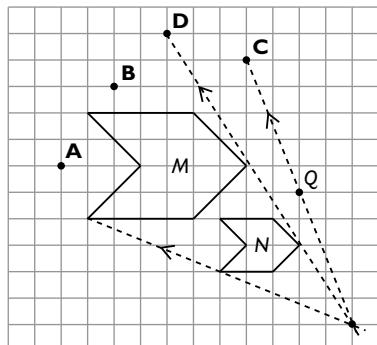
7. C
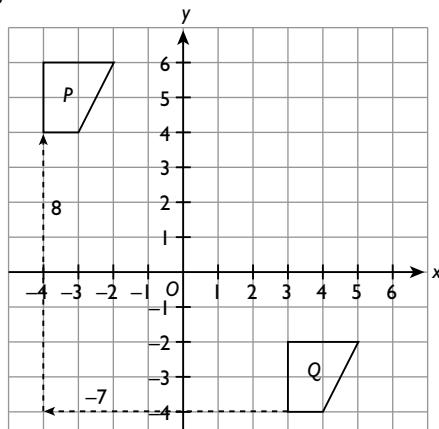
Translasi $\begin{pmatrix} -7 \\ 8 \end{pmatrix}$

8. C
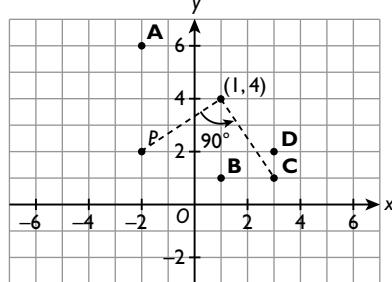
9. D

$$p(p – 10q) – (p – 5q)^2$$
$$= p^2 – 10pq – (p^2 – 10pq + 25q^2)$$
$$= p^2 – 10pq – p^2 + 10pq – 25q^2$$
$$= –25q^2$$

10. B

$$(3x – y)^2 + x(6y – x)$$
$$= 9x^2 – 6xy + y^2 + 6xy – x^2$$
$$= 8x^2 + y^2$$

11. D

Luas segi empat tepat yang tinggal
$$= (8x \times 6y) – (3x \times 2y)$$
$$= 48xy – 6xy$$
$$= 42xy \text{ cm}^2$$

12. B

$$\frac{3p^2 – 6p}{p^2 – 4} = \frac{3p(p – 2)^1}{(p + 2)(p – 2)_1}$$
$$= \frac{3p}{p + 2}$$

13. D

$$\frac{2}{3p} - \frac{1-p}{6p^2} = \frac{2(2p) - 1 + p}{6p^2}$$

$$= \frac{4p - 1 + p}{6p^2}$$

$$= \frac{5p - 1}{6p^2}$$

14. A

$$\frac{x^2}{x^2 - 1} \div \frac{x}{x + 1} = \frac{x^{2\,1}}{(x+1)(x-1)_1} \times \frac{x+1^1}{x_1}$$

$$= \frac{x}{x - 1}$$

15. C

$$L = \pi j^2$$

$$L = \frac{22}{7}\left(\frac{x}{2}\right)^2$$

$$L = \frac{22}{7} \times \frac{x^2}{4}$$

$$L = \frac{11}{14}x^2$$

16. C

$$q = \frac{p^2 - 12}{4}$$

$$4q = p^2 - 12$$

$$p^2 = 4q + 12$$

$$= 4(q + 3)$$

$$p = \sqrt{4(q + 3)}$$

$$= 2\sqrt{q + 3}$$

17. A

$$\frac{27x}{y^3} = \frac{1}{x^2}$$

$$x^2(x) = \frac{y^3}{27}$$

$$x^3 = \frac{y^3}{27}$$

$$x = \sqrt[3]{\frac{y^3}{3^3}}$$

$$= \frac{y}{3}$$

18. D

$$3(y - 3) = 27$$

$$y - 3 = 9$$

$$y = 12$$

19. B

$$\frac{p}{3} + 7 = -1 - p$$

$$\frac{p}{3} + p = 1 - 7$$

$$\frac{p + 3p}{3} = -8$$

$$4p = -24$$

$$p = -6$$

20. B

$$2^{2x - 1} = 32$$

$$2^{2x - 1} = 2^5$$

$$\therefore\ 2x - 1 = 5$$

$$2x = 6$$

$$x = 3$$

21. C

$$\frac{45(p^4)^2(q^3)^{-2}}{(3pq^{-5})^2} = \frac{45p^8q^{-6}}{9p^2q^{-10}}$$

$$= 5p^{8-2}q^{-6+10}$$

$$= 5p^6q^4$$

22. C

$$(4xy^2)^3 \div 8x^{-2}y^2 = \frac{64x^3y^6}{8x^{-2}y^2}$$

$$= 8x^{3+2}y^{6-2}$$

$$= 8x^5y^4$$

23. D

$$\frac{3^{\frac{3}{2}} \times 6^{\frac{3}{2}}}{8^{\frac{1}{2}}} = \frac{3^{\frac{3}{2}} \times (3 \times 2)^{\frac{3}{2}}}{(2^3)^{\frac{1}{2}}}$$

$$= \frac{3^{\frac{3}{2}} \times 3^{\frac{3}{2}} \times 2^{\frac{3}{2}}}{2^{\frac{3}{2}}}$$

$$= 3^{\frac{3}{2} + \frac{3}{2}} \times 2^{\frac{3}{2} - \frac{3}{2}}$$

$$= 3^3 \times 2^0 \quad\leftarrow\quad \boxed{2^0 = 1}$$

$$= 27$$

24. C

$$\frac{5 + 4k}{3} < 2k + 3$$

$$5 + 4k < 6k + 9$$

$$4k - 6k < 9 - 5$$

$$-2k < 4$$

$$k > -2$$

25. C

$$2 < x \le 6 \quad \text{dan} \quad 3 < y < 9$$

Nilai maksimum bagi $x = 6$
Nilai maksimum bagi $y = 8$

$\therefore$ Nilai maksimum bagi $xy = 6 \times 8$

$$= 48$$

26. B

$$\frac{x}{2} - 3 \le 1 \quad \text{dan} \quad 5 - x < 0$$

$$\frac{x}{2} \le 4 \qquad\qquad -x < -5$$

$$x \le 8 \qquad\qquad x > 5$$

$$5 < x \le 8$$
$$\therefore x = 6, 7, 8$$

27. B

Bilangan rumah yang telah dijual dalam bulan Ogos
$$= 5 \times 10$$
$$= 50$$

Jumlah bilangan rumah yang telah dijual
$$= (4 + 2 + 5) \times 10$$
$$= 11 \times 10$$
$$= 110$$

28. D

Min jisim sebiji tembikai

$$= \frac{\begin{array}{c}(1 \times 1.5) + (2 \times 2.0) + (6 \times 2.5) + (7 \times 3.0) \\ + (3 \times 3.5) + (1 \times 4.0)\end{array}}{1 + 2 + 6 + 7 + 3 + 1}$$

$$= \frac{54}{20}$$

$$= 2.8 \text{ kg}$$

29. B

Jumlah murid lelaki = 3 + 5 + 6
$$= 14$$

Jumlah murid perempuan = 7 + 6 + 5
$$= 18$$

$$\therefore \text{Beza} = 18 - 14$$
$$= 4$$

30. C

Jumlah bilangan murid = 7 + 11 + 13 + 9
$$= 40$$

$$x° = \frac{11}{40} \times 360°$$
$$= 99°$$

$$y° = \frac{9}{40} \times 360°$$
$$= 81°$$

$$\therefore \text{Beza sudut} = 99° - 81°$$
$$= 18°$$

KERTAS 2

1.
$$2x - y = 7 \quad \text{......} ①$$
$$x - 6y = -13 \quad \text{......} ②$$

② × 2: $2x - 12y = -26$ ...... ③
① – ③: $\quad 11y = 33$
$$\qquad\qquad y = 3$$

Gantikan $y = 3$ dalam ②.
$$x - 6(3) = -13$$
$$x = -13 + 18$$
$$= 5$$
$$\therefore x = 5, y = 3$$

2.
$$\frac{3}{2}x + y = 4 \quad \text{......} ①$$
$$2x - 3y = 1 \quad \text{......} ②$$

① × 4: $6x + 4y = 16$ ...... ③
② × 3: $6x - 9y = 3$ ...... ④
③ – ④: $\quad 13y = 13$
$$\qquad\qquad y = 1$$

Gantikan $y = 1$ dalam ②.
$$2x - 3(1) = 1$$
$$2x = 4$$
$$x = 2$$
$$\therefore x = 2, y = 1$$

3.
$$4m - n = 1 \quad \text{......} ①$$
$$2m = \frac{2n + 3}{2} \quad \text{......} ②$$

Daripada ②: $4m = 2n + 3$
$$4m - 2n = 3 \quad \text{......} ③$$
① – ③: $\quad n = -2$

Gantikan $n = -2$ dalam ①.
$$4m - (-2) = 1$$
$$4m = 1 - 2$$
$$4m = -1$$
$$m = -\frac{1}{4}$$
$$\therefore m = -\frac{1}{4}, n = -2$$

4. Katakan umur Pak Abu = x tahun dan umur anaknya = y tahun sekarang.

$$x - y = 32 \quad \text{......} ①$$
$$x - 8 = 3(y - 8)$$
$$x - 8 = 3y - 24$$
$$x - 3y = -16 \quad \text{......} ②$$

① – ②: $\quad 2y = 48$
$$\qquad y = 24$$

Gantikan $y = 24$ dalam ①.
$$x - 24 = 32$$
$$x = 32 + 24$$
$$= 56$$

Selepas 3 tahun, umur Pak Abu = 56 + 3
$$= 59 \text{ tahun}$$

5. $JL = 10 \text{ cm} \div 2 = 5 \text{ cm}$

Isi padu gabungan pepejal

$= \left(\frac{1}{4} \times \frac{22}{7} \times 3.5^2 \times 5\right) + \left[\frac{1}{2} \times (5 + 10) \times 3.5 \times 12\right]$

$= 48.125 + 315$

$= 363.125 \text{ cm}^3$

6. Luas prisma tegak + Luas sukuan silinder = 1 028 cm³

$\left[\frac{1}{2} \times (7 + 11) \times LS \times 8\right] + \left(\frac{1}{4} \times \frac{22}{7} \times 7^2 \times 8\right) = 1\ 028$

$72LS + 308 = 1\ 028$

$72LS = 720$

$LS = 10 \text{ cm}$

7. Jejari kon = 14 cm ÷ 2 = 7 cm

Jejari silinder = 7 cm ÷ 2 = 3.5 cm

Isi padu pepejal yang tinggal

= Isi padu kon – Isi padu silinder

$= \left(\frac{1}{3} \times \frac{22}{7} \times 7^2 \times 12\right) - \left(\frac{22}{7} \times 3.5^2 \times 4\right)$

$= 616 - 154$

$= 462 \text{ cm}^3$

8. Isi padu pepejal yang tinggal

= Isi padu prisma tegak – Isi padu separuh silinder

$= \left[\frac{1}{2} \times (16 + 20) \times 12 \times 14\right]$

$\quad - \left[\frac{1}{2} \times \frac{22}{7} \times \left(\frac{16}{2}\right) \times 14\right]$

$= 3\ 024 - 1\ 408$

$= 1\ 616 \text{ cm}^3$

9. (a) $OT = 21 - 7 = 14 \text{ cm}$

Perimeter seluruh rajah

= SP + Lengkok PQ + QO + OT + Lengkok TS

$= 7 + \left(\frac{90}{360} \times 2 \times \frac{22}{7} \times 21\right) + 21 + 14 +$

$\left(\frac{150}{360} \times 2 \times \frac{22}{7} \times 14\right)$

$= 7 + 33 + 21 + 14 + 36\frac{2}{3}$

$= 111\frac{2}{3} \text{ cm atau } 111.67 \text{ cm}$

(b) Luas seluruh rajah

= Luas sukuan bulatan POQ + Luas sektor OST

$= \left(\frac{1}{4} \times \frac{22}{7} \times 21^2\right) + \left(\frac{150}{360} \times \frac{22}{7} \times 14^2\right)$

$= 346\frac{1}{2} + 256\frac{2}{3}$

$= 603\frac{1}{6} \text{ cm}^2 \text{ atau } 603.17 \text{ cm}^2$

10. (a) Perimeter seluruh rajah

= OP + Lengkok PQ + QR + Lengkok RST + TO

$= 7 + \left(\frac{45}{360} \times 2 \times \frac{22}{7} \times 7\right) + 7$

$\quad + \left(\frac{135}{360} \times 2 \times \frac{22}{7} \times 14\right) + 14$

$= 7 + 5\frac{1}{2} + 7 + 33 + 14$

$= 66\frac{1}{2} \text{ cm atau } 66.5 \text{ cm}$

(b) Luas kawasan berlorek

= Luas sektor OPQ + Luas sektor ORST – Luas semibulatan OQRU

$= \left(\frac{45}{360} \times \frac{22}{7} \times 7^2\right) + \left(\frac{135}{360} \times \frac{22}{7} \times 14^2\right)$

$\quad - \left(\frac{1}{2} \times \frac{22}{7} \times 7^2\right)$

$= 19\frac{1}{4} + 231 - 77$

$= 173\frac{1}{4} \text{ cm}^2 \text{ atau } 173.25 \text{ cm}^2$

11. (a) $JS = JM = LM = RL = 14 \text{ cm} \div 2 = 7 \text{ cm}$

$PS = QR = 28 \text{ cm} \div 2 + 6 \text{ cm}$

$= 14 \text{ cm} + 6 \text{ cm}$

$= 20 \text{ cm}$

Perimeter kawasan berlorek

= JS + ST + Lengkok TU + Lengkok UV + VR + RL + Lengkok JKL

$= 7 + 6 + \left(\frac{1}{4} \times 2 \times \frac{22}{7} \times 14\right)$

$\quad + \left(\frac{1}{4} \times 2 \times \frac{22}{7} \times 14\right) + 6 + 7$

$\quad + \left(\frac{1}{2} \times 2 \times \frac{22}{7} \times 7\right)$

$= 7 + 6 + 22 + 22 + 6 + 7 + 22$

$= 92 \text{ cm}$

(b) Luas kawasan berlorek

= Luas segi empat tepat PQRS – Luas sukuan PUT – Luas sukuan QUV – Luas semibulatan MJKL

$= (28 \times 20) - \left(\frac{1}{4} \times \frac{22}{7} \times 14^2\right) - \left(\frac{1}{4} \times \frac{22}{7} \times 14^2\right)$

$\quad - \left(\frac{1}{2} \times \frac{22}{7} \times 7^2\right)$

$= 560 - 154 - 154 - 77$

$= 175 \text{ cm}^2$

12. (a) $OE = \frac{3}{2} \times 14 \text{ cm} = 21 \text{ cm}$

Perimeter kawasan berlorek

= OE + Lengkok EF + FC + Lengkok CB
+ BO + OC + Lengkok CD + DO

$= 21 + \left(\frac{90}{360} \times 2 \times \frac{22}{7} \times 21\right) + 7$

$\quad + \left(\frac{45}{360} \times 2 \times \frac{22}{7} \times 14\right) + 14 + 14$

$\quad + \left(\frac{75}{360} \times 2 \times \frac{22}{7} \times 14\right) + 14$

$= 21 + 33 + 7 + 11 + 14 + 14 + 18\frac{1}{3} + 14$

$= 132\frac{1}{3} \text{ cm atau } 132.33 \text{ cm}$

(b) Luas kawasan berlorek

= (Luas sukuan OEF – Luas sukuan OAC)
+ (Luas sektor OAB + Luas sektor OCD)

$= \left(\frac{90}{360} \times \frac{22}{7} \times 21^2 - \frac{90}{360} \times \frac{22}{7} \times 14^2\right)$

$\quad + \left(\frac{45 + 75}{360} \times \frac{22}{7} \times 14^2\right)$

$= 346\frac{1}{2} - 154 + 205\frac{1}{3}$

$= 397\frac{5}{6} \text{ cm}^2 \text{ atau } 397.83 \text{ cm}^2$

PENILAIAN AKHIR TAHUN
KERTAS 1

1. C

$$0.076\underline{0}31 \rightarrow 0.0760$$

| 3 < 5 |

2. B

$$3.818 \times 10^{-5} = 0.00003818$$

3. C

$4.65 \times 10^{-4} + 3.74 \times 10^{-5}$
$= 4.65 \times 10^{-4} + 0.374 \times 10^{-4}$
$= (4.65 + 0.374) \times 10^{-4}$
$= 5.024 \times 10^{-4}$

4. B

Isi padu gabungan pepejal
= Isi padu prisma tegak + Isi padu separuh silinder
$= \left(\frac{1}{2} \times 7 \times 8 \times 12\right) + \left(\frac{1}{2} \times \frac{22}{7} \times 3.5^2 \times 12\right)$
$= 336 + 231$
$= 567 \text{ cm}^3$
$= 567 \times 10^{-6} \text{ m}^3$ ← [1 cm³ = 10⁻⁶ m³]
$= 5.67 \times 10^2 \times 10^{-6} \text{ m}^3$
$= 5.67 \times 10^{-4} \text{ m}^3$

5. D

| Sudut pedalaman sebuah oktagon sekata = 135° |

Sudut refleks $QRS = 360° - 135°$
$\qquad\qquad\qquad = 225°$
$\angle RSN = 180° - 135° = 45°$
$x° + 30° + 225° + 45° = 360°$
$\qquad\qquad x + 300 = 360$
$\qquad\qquad\qquad\quad x = 60$

6. A

$x = \dfrac{360 - 120 - 120}{2}$

$\quad = 60$
$y = 90$
$z = 90 + 30$
$\quad = 120$

$\therefore x + y - z = 60 + 90 - 120$
$\qquad\qquad\qquad = 30$
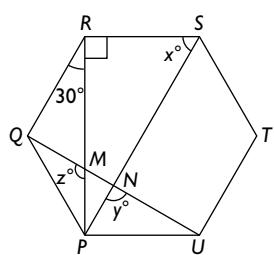
7. A

$\angle KOL = \angle LOM = \angle MON = 180° - 72° - 72°$
$\qquad\qquad\qquad\qquad\qquad\qquad = 36°$
$x = 3 \times 36$
$\quad = 108$
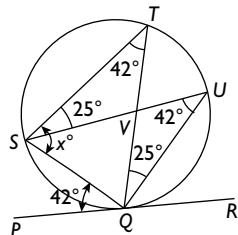
8. C

$\angle TSU = \angle TQU = 25°$
$\angle SUQ = \angle STQ = 42°$

$\angle QSU = 180° - 90° - 42°$
$\qquad\qquad = 48°$

$x° = \angle TSU + \angle QSU$
$x = 25 + 48$
$\quad = 73$

9. C

$\angle QTS = 180° - 130° = 50°$

$\angle QPU + \angle QTU = 180°$

$\therefore x + y = 50 + 180$
$\qquad\qquad = 230$

10. A

$OC = 5 + 3 = 8 \text{ cm}$
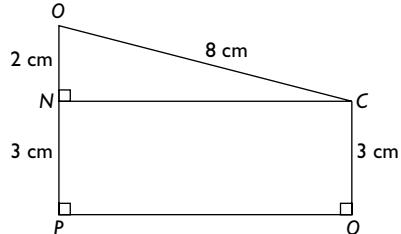
$PQ = NC = \sqrt{8^2 - 2^2}$
$\qquad\qquad = \sqrt{60}$
$\qquad\qquad = 7.75 \text{ cm}$

11. D

Q ialah imej bagi P di bawah satu translasi $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$.

12. A

13. C
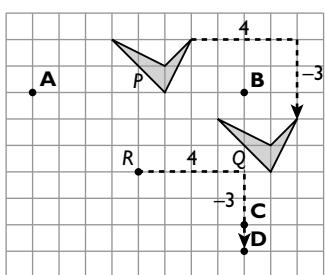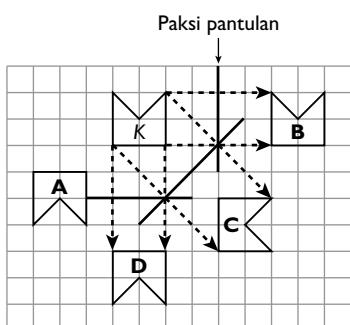
$$\frac{x + 2}{x} = \frac{x - 1}{2}$$
$$2(x + 2) = x(x - 1)$$
$$2x + 4 = x^2 - x$$
$$x^2 - 3x - 4 = 0$$
$$(x + 1)(x - 4) = 0$$
$$x + 1 = 0 \quad \text{atau} \quad x - 4 = 0$$
$$x = -1 \qquad\qquad x = 4$$
$$\therefore x = -1, 4$$

14. B

$$2y^2 - 9y - 2 + 4(y + 1)$$
$$= 2y^2 - 9y - 2 + 4y + 4$$
$$= 2y^2 - 5y + 2$$
$$= (2y - 1)(y - 2)$$

15. C

$$\sqrt{\frac{p - 2}{4}} = q$$
$$\frac{p - 2}{4} = q^2$$
$$p - 2 = 4q^2$$
$$p = 4q^2 + 2$$

16. D

$$\frac{2}{3n} - \frac{1 - n}{6n^2} = \frac{2(2n) - (1 - n)}{6n^2}$$
$$= \frac{4n - 1 + n}{6n^2}$$
$$= \frac{5n - 1}{6n^2}$$

17. C

$KL = JM = (x + 2)$ cm

Perimeter segi empat tepat $JKLM = (20 + 3x)$ cm
$$2(x + 2) + 2x = 20 + 3x$$
$$2x + 4 + 2x = 20 + 3x$$
$$x = 16$$

18. C

$$\left(\frac{9}{25}\right)^{-\frac{1}{2}} = \left(\frac{25}{9}\right)^{\frac{1}{2}}$$
$$= \sqrt{\frac{25}{9}}$$
$$= \frac{5}{3}$$
$$= 1\frac{2}{3}$$

19. D

$$(2hk^{-3})^3 \times h^{-2}k^5 = 8h^3k^{-9} \times h^{-2}k^5$$
$$= 8h^{3 - 2}k^{-9 + 5}$$
$$= 8hk^{-4}$$
$$= \frac{8h}{k^4}$$

20. B

$$5w - 2 \le 10 + 7w$$
$$-2 - 10 \le 7w - 5w$$
$$-12 \le 2w$$
$$2w \ge -12$$
$$w \ge -6$$

21. C

$$5 < 2x - 3 \quad \text{dan} \quad 2x - 3 \le 13$$
$$8 < 2x \qquad\qquad\qquad 2x \le 16$$
$$2x > 8 \qquad\qquad\qquad x \le 8$$
$$x > 4$$
$$4 < x \le 8$$
$$\therefore x = 5, 6, 7, 8$$

22. A

$$\cos x° = \frac{4}{5}$$

$$\frac{8}{PR} = \frac{4}{5}$$

$$PR = 8 \times \frac{5}{4}$$

$$= 10 \text{ cm}$$

$$QR = \sqrt{10^2 - 8^2}$$

$$= \sqrt{36}$$

$$= 6 \text{ cm}$$

$$\sin y° = \frac{12}{13}$$

$$\frac{12}{QS} = \frac{12}{13}$$

$$QS = 13 \text{ cm}$$

$$\therefore RS = 13 - 6$$

$$= 7 \text{ cm}$$

23. B

$$\cos a° + \sin b° = 0.65 + 0.48$$

$$= 1.13$$

24. A
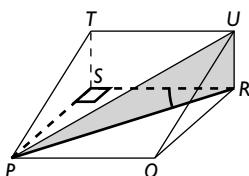
Sudut di antara satah *PRU* dengan satah *RSTU*
= $\angle PRS$

25. A

$$MT = \sqrt{15^2 - 9^2} = 12 \text{ cm}$$
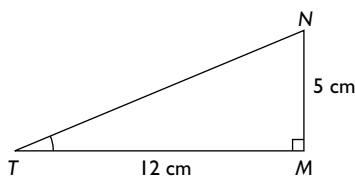
Sudut di antara garis *NT* dengan tapak *PST*
= $\angle MTN$

$$\tan \angle MTN = \frac{5}{12}$$

$$\angle MTN = 22° 37'$$

26. B

27. B
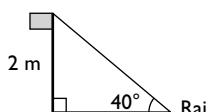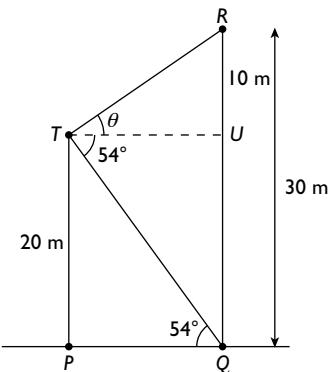
$$\tan 54° = \frac{20}{PQ}$$

$$PQ = \frac{20}{\tan 54°}$$

$$= 14.53 \text{ m}$$

$$\tan \theta = \frac{10}{14.53}$$

$$\theta = 34° 32'$$

28. C

$$\frac{2}{3}y + \frac{1}{2}x = 6$$

Pada paksi-*y*, $x = 0$.

$$\frac{2}{3}y + \frac{1}{2}(0) = 6$$

$$y = 6 \times \frac{3}{2}$$

$$= 9$$

$\therefore$ Pintasan-*y* = 9

29. C

$P(-3, -1)$ dan $R(4, 6)$

$\therefore$ Koordinat titik $Q = (-3, 6)$

$$m_{PR} = \frac{6 - (-1)}{4 - (-3)} = \frac{7}{7} = 1$$

Gantikan $m = 1$ dan $(4, 6)$ dalam $y = mx + c$.

$$6 = 1(4) + c$$

$$c = 2$$

Koordinat titik $S = (0, 2)$

Persamaan garis lurus *QS*:

$$\frac{y - 2}{6 - 2} = \frac{x - 0}{-3 - 0}$$

$$\frac{y - 2}{4} = \frac{x}{-3}$$

$$-3y + 6 = 4x$$

$$3y + 4x = 6$$

30. A

$4y + 3x = 24$
Pada paksi-y, $x = 0$.
$4y + 3(0) = 24$
$4y = 24$
$y = 6$

Koordinat titik $P = (0, 6)$
$\therefore$ Koordinat titik $M = (0, 3)$

Pada paksi-x, $y = 0$.
$4(0) + 3x = 24$
$3x = 24$
$x = 8$

Koordinat titik $Q = (8, 0)$
$\therefore$ Koordinat titik $N = (4, 0)$

Koordinat titik tengah $MN = \left(\dfrac{0 + 4}{2}, \dfrac{3 + 0}{2} \right)$
$= (2, 1.5)$

31. C

$\dfrac{30}{100} \times 360° = 108°$
$x = 360 - 40 - 100 - 108$
$= 112$

32. C

Min jisim $= 3.05$ kg

$\dfrac{(6 \times 1.45) + (15 \times 2.45) + x(3.45) + (7 \times 4.45) + (2 \times 5.45)}{6 + 15 + x + 7 + 2} = 3.05$

$\dfrac{8.7 + 36.75 + 3.45x + 31.15 + 10.9}{30 + x} = 3.05$

$87.5 + 3.45x = 91.5 + 3.05x$
$0.4x = 4$
$x = 10$

33. B

Peratusan murid yang gagal
$= \dfrac{1 + 3}{1 + 3 + 8 + 6 + 2} \times 100\%$
$= \dfrac{4}{20} \times 100\%$
$= 20\%$

34. A

$k = 1 - \dfrac{2}{5} - \dfrac{1}{3}$
$= \dfrac{4}{15}$
Bilangan pen hitam $= \dfrac{4}{15} \times 45$
$= 12$

35. C

$P \cap (Q \cup R)'$
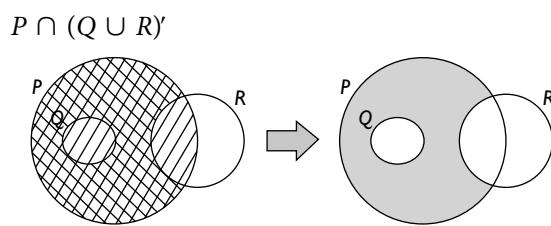
36. D
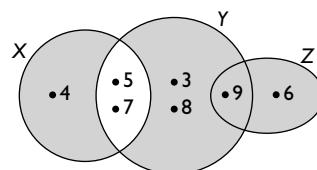
$(X \cap Y)' = \{3, 4, 6, 8, 9\}$

37. C

Bilangan murid yang menyertai satu kelab sahaja $= 19$
$x + 8 + 5 = 19$
$x = 19 - 13$
$= 6$

Bilangan murid yang menyertai dua kelab sahaja
$= 6 + 3 + 2(6)$
$= 6 + 3 + 12$
$= 21$

38. C

Set nombor yang mengandungi sekurang-kurangnya satu digit 1
$= \{1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 31, 41, 51, 61, 71, 81, 91, 100\}$

Kebarangkalian $= \dfrac{20}{100}$
$= \dfrac{1}{5}$

39. A

$\dfrac{24}{30 + k + 24 + 18} = \dfrac{3}{10}$
$\dfrac{24}{72 + k} = \dfrac{3}{10}$
$72 + k = 24 \times \dfrac{10}{3}$
$= 80$
$k = 8$

40. D

P(keluarga yang mempunyai lebih daripada 3 orang anak)

$$= \frac{44 + 26}{35 + 45 + 34 + 56 + 44 + 26}$$

$$= \frac{70}{240}$$

$$= \frac{7}{24}$$

KERTAS 2

1. (a)
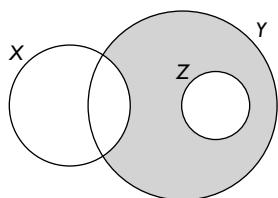
(b)
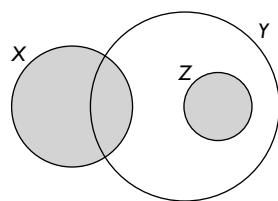
2. (a) $\angle EAM$ atau $\angle MAE$

(b) $AE = \sqrt{6^2 + 8^2} = 10$ cm

$EM = \frac{1}{2} \times 10$ cm $= 5$ cm

$\tan \angle EAM = \frac{5}{10}$

$$= \frac{1}{2}$$
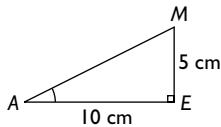
$\angle EAM = 26.57°$ atau $26° 34'$

3.   Luas trapezium $= 40$ cm^2

$\frac{1}{2} \times (2x + y + 3) \times 4 = 40$

$4x + 2y + 6 = 40$

$4x + 2y = 34$ …… ①

Perimeter segi empat tepat $= 36$ cm

$2(3x + \frac{2}{3}y) = 36$

$3x + \frac{2}{3}y = 18$

$\times 3$: $\qquad 9x + 2y = 54$ …… ②

② − ①: $\qquad 5x = 20$

$\qquad\qquad\qquad x = 4$

Gantikan $x = 4$ dalam ①.

$4(4) + 2y = 40$

$16 + 2y = 40$

$2y = 18$

$y = 9$

$\therefore x = 4, y = 9$

4. (a) Luas kawasan berlorek $= (8 + x - 3) \times 3$

$= (5 + x) \times 3$

$= (15 + 3x)$ cm^2

(b) Luas kawasan tidak berlorek $= 21$ cm^2

Luas $ABCD$ − Luas $EFCG = 21$ cm^2

$(8 + x) \times x - (15 + 3x) = 21$

$8x + x^2 - 15 - 3x - 21 = 0$

$x^2 + 5x - 36 = 0$

$(x + 9)(x - 4) = 0$

$x + 9 = 0$ atau $x - 4 = 0$

$x = -9$ $\qquad\qquad x = 4$

(Tidak mungkin)

$\therefore x = 4$

5. (a) $SV = \sqrt{9^2 + 12^2}$

$= \sqrt{225}$

$= 15$ cm

$ST = SV - TV$

$= 15 - 11$

$= 4$ cm

(b) $\sin \angle SRT = \frac{2}{3}$

$\frac{ST}{RT} = \frac{2}{3}$

$\frac{4}{RT} = \frac{2}{3}$

$RT = 4 \times \frac{3}{2}$

$= 6$ cm

(c) $\kos \angle RTV = -\kos \angle RTS$

$= -\frac{4}{6}$

$= -\frac{2}{3}$

6. (a) P(huruf A) $= \frac{3}{11}$

(b) Katakan bilangan kad berlabel dengan huruf S yang ditambah ke dalam kotak $= x$.

P(huruf S) $= \frac{2}{5}$

$\frac{2 + x}{11 + x} = \frac{2}{5}$

$10 + 5x = 22 + 2x$

$3x = 12$

$x = 4$

7. Isi padu gabungan pepejal
= Isi padu prisma tegak + Isi padu piramid

$$= \left[\frac{1}{2} \times (6 + 8) \times 5 \times 6\right] + \left(\frac{1}{3} \times 6 \times 6 \times 4\right)$$

$$= 210 + 48$$
$$= 258 \text{ cm}^3$$

8. (a) Dalam ΔEFK,

$$68° + x° + x° = 180° \quad \leftarrow \boxed{EF = EK}$$
$$x = \frac{180 - 68}{2}$$
$$= 56$$

(b) $\angle EKF = \angle EFK = 56°$ dan $\angle EKO = 90°$

$$y° + 56° = 90°$$
$$y = 90 - 56$$
$$= 34$$

(c) $\angle JFK = \dfrac{108°}{2} = 54°$

$$\angle FHJ = \angle EFJ$$
$$z° = 56° + 54° \quad \leftarrow \boxed{\angle EFJ = \angle EFK + \angle KFJ}$$
$$= 110°$$
$$z = 110$$

9. (a) (i) Pernyataan
Statement

(ii) Bukan pernyataan
Not a statement

(b) Segi tiga PQR ialah sebuah segi tiga sama kaki.
Triangle PQR is an isosceles triangle.

(c) $-16 = 5(0)^2 - 16$
$-11 = 5(1)^2 - 16$
$4 = 5(2)^2 - 16$
$29 = 5(3)^2 - 16$
$\vdots$

Kesimpulan umum: $5n^2 - 16$, $n = 0, 1, 2, 3, \ldots$

10. (a) Persamaan garis lurus BC: $x = 2$

(b) $y = 3x + 6$
Pada paksi-x, $y = 0$.
$$0 = 3x + 6$$
$$3x = -6$$
$$x = -2$$
$\therefore$ Pintasan-$x = -2$

(c) Koordinat-y bagi titik $C = 12 - 7 \leftarrow$
$$= 5 \quad \boxed{BC = 7 \text{ unit}}$$

Koordinat titik $C = (2, 5)$
$m_{CD} = m_{AB} = 3 \quad \leftarrow \boxed{AB \text{ selari dengan } CD.}$

Gantikan $m = 3$ dan $(2, 5)$ dalam $y = mx + c$.
$$5 = 3(2) + c$$
$$c = -1$$

$\therefore$ Persamaan garis lurus CD: $y = 3x - 1$

11. (a) Perimeter seluruh rajah
= PT + Lengkok PQR + RS + Lengkok ST

$$= 3.5 + \left(\frac{270}{360} \times 2 \times \frac{22}{7} \times 3.5\right) + 3.5 +$$
$$\left(\frac{90}{360} \times 2 \times \frac{22}{7} \times 7\right)$$

$$= 3.5 + 16.5 + 3.5 + 11$$
$$= 34.5 \text{ cm}$$

(b) Luas kawasan berlorek
= Luas sektor $OPQR$ + Luas segi tiga POR
$$= \left(\frac{270}{360} \times \frac{22}{7} \times 3.5^2\right) + \left(\frac{1}{2} \times 3.5 \times 3.5\right)$$
$$= 28.875 + 6.125$$
$$= 35 \text{ cm}^2$$

12. (a) (i) $2x + y = 6$
$$y = -2x + 6 \quad \leftarrow \boxed{\text{Tulis persamaan dalam bentuk am, } y = mx + c \text{ dahulu.}}$$

$\therefore$ Kecerunan garis lurus $PQ = -2$

(ii) Pada paksi-x, $y = 0$.
$$0 = -2x + 6$$
$$2x = 6$$
$$x = 3$$
$\therefore$ Pintasan-$x = 3$

(iii) Gantikan $m = -2$ dan $(1, -3)$ dalam
$y = mx + c$.
$$-3 = -2(1) + c$$
$$c = -3 + 2$$
$$= -1$$
$\therefore$ Persamaan satu garis lurus yang melalui titik $(1, -3)$ dan selari dengan garis lurus PQ ialah $y = -2x - 1$.

(b) (i) Katakan koordinat titik $L = (0, y)$.

$$m_{KL} = m_{MN} = \frac{1}{2}$$
$$\frac{y - 6}{0 - 6} = \frac{1}{2}$$
$$y - 6 = \frac{1}{2}(-6)$$
$$y = -3$$

$\therefore$ Pintasan-$y = 3$

(ii) Pada paksi-x, $y = 0$.

$$0 = \frac{1}{2}x - 1$$
$$\frac{1}{2}x = 1$$
$$x = 2$$

Koordinat titik $M = (2, 0)$

Kecerunan KN = Kecerunan LM

$$= -\frac{\text{Pintasan-}y}{\text{Pintasan-}x}$$
$$= -\frac{3}{2}$$

(iii) Gantikan $m = -\dfrac{3}{2}$ dan $c = 3$ dalam
$y = mx + c$.
Persamaan garis lurus LM ialah
$y = -\dfrac{3}{2}x + 3$

**13.** (a) (i) $PR = \sqrt{12^2 + 16^2}$
$= \sqrt{400}$
$= 20$ m
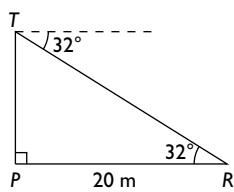
$\tan \angle PRT = \dfrac{PT}{20}$

$\tan 32° = \dfrac{PT}{20}$

$PT = 20 \tan 32°$
$= 12.50$ m

(ii)
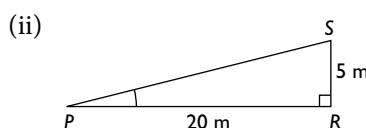
Sudut dongakan titik S dari titik P
$= \angle SPR$

$\tan \angle SPR = \dfrac{5}{20}$

$\angle SPR = 14.04°$ atau $14° \, 2'$

(b) (i) $\angle DBE$ atau $\angle EBD$

(ii) $BD = \sqrt{6^2 + 8^2}$
$= \sqrt{100}$
$= 10$ cm


$\tan \angle DBE = \dfrac{10}{10}$
$= 1$
$\angle DBE = 45°$

(iii) Sudut di antara satah BDE dengan satah $ADEF = \angle ADB$ atau $\angle BDA$

$\tan \angle ADB = \dfrac{6}{8}$
$\angle ADB = 36.87°$ atau $36° \, 52'$

14. (a)

| Ketebalan *Thickness* **(mm)**	Sempadan atas *Upper boundary*	Kekerapan *Frequency*	Kekerapan longgokan *Cumulative frequency*
15 – 19	19.5	0	0
20 – 24	24.5	2	2
25 – 29	29.5	3	5
30 – 34	34.5	6	11
35 – 39	39.5	8	19
40 – 44	44.5	14	33
45 – 49	49.5	10	43
50 – 54	54.5	5	48
55 – 59	59.5	2	50

(b) Min ketebalan sebatang bongkah kayu

$= \dfrac{(2 \times 22) + (3 \times 27) + (6 \times 32) + (8 \times 37) + (14 \times 42) + (10 \times 47) + (5 \times 52) + (2 \times 57)}{50}$

$= \dfrac{2\,045}{50}$

$= 40.9$ mm

(c)

Kekerapan longgokan
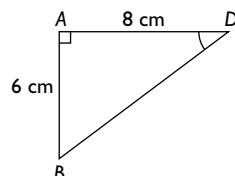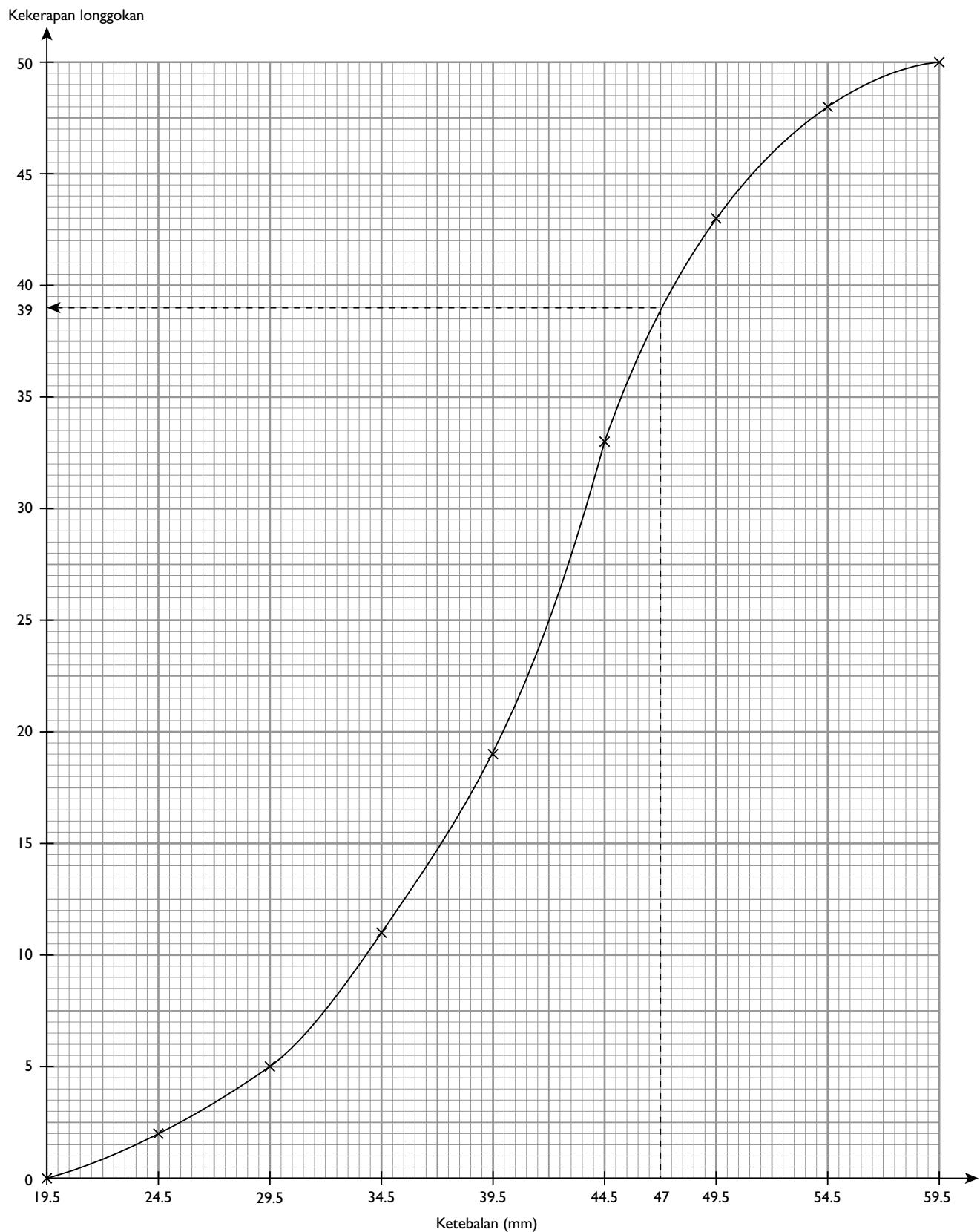
Ketebalan (mm)

(d) Daripada ogif, bilangan bongkah kayu yang ketebalan melebihi 47 mm = 50 – 39

= 11

15. (a)

Masa putaran (minit) _Spinning time (minutes)_	Kekerapan _Frequency_	Titik tengah _Midpoint_
21 – 30	3	25.5
31 – 40	4	35.5
41 – 50	5	45.5
51 – 60	8	55.5
61 – 70	3	65.5
71 – 80	2	75.5

(b) (i) Kelas mod = 51 – 60 minit

(ii) Min masa putaran $= \dfrac{(3 \times 25.5) + (4 \times 35.5) + (5 \times 45.5) + (8 \times 55.5) + (3 \times 65.5) + (2 \times 75.5)}{25}$

$\qquad\qquad\qquad\quad = \dfrac{1\,237.5}{25}$

$\qquad\qquad\qquad\quad = 49.5$ minit

(c)
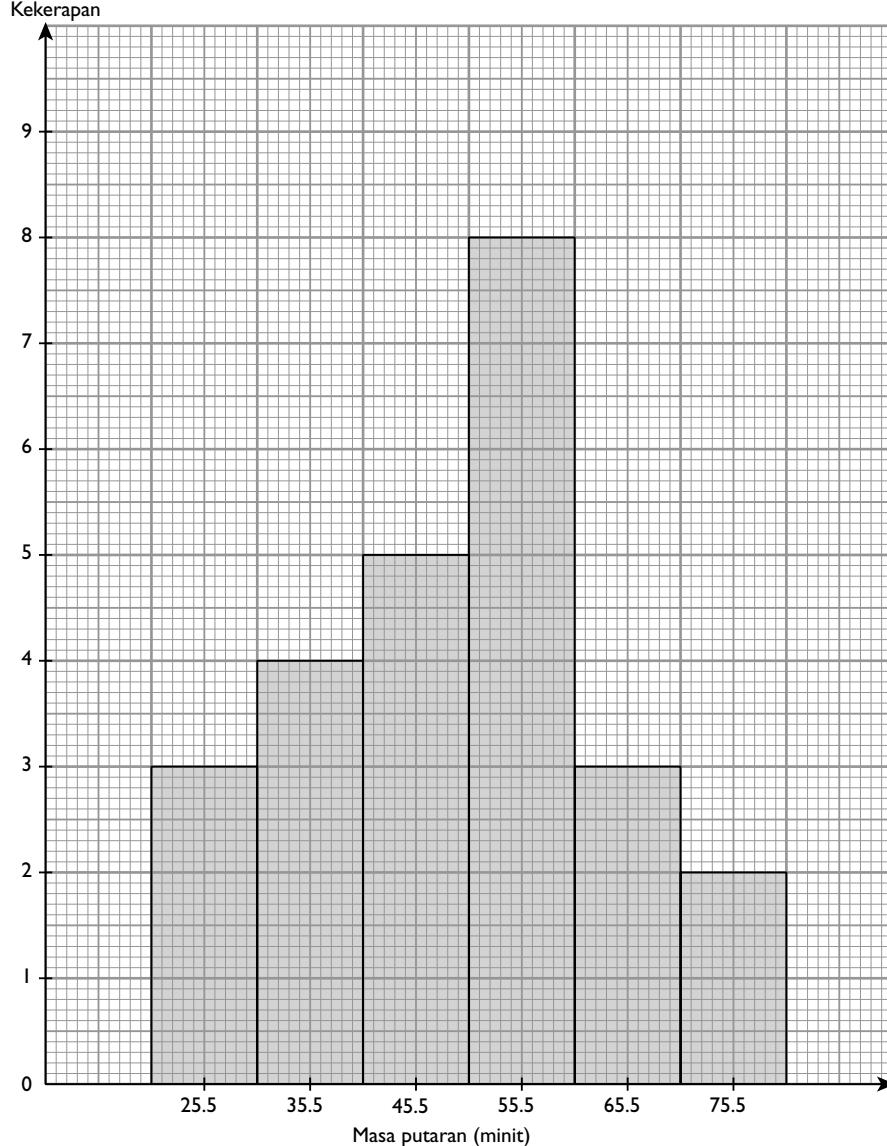
(d) Daripada histogram, bilangan gasing yang masa putaran melebihi satu jam (60 minit) = 3 + 2

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad = 5$

16. (a) (i) $\sin \angle SPQ = \dfrac{4}{5}$

$$\dfrac{QS}{15} = \dfrac{4}{5}$$

$$QS = \dfrac{4}{5} \times 15$$

$$= 12 \text{ cm}$$

$$PQ = \sqrt{15^2 - 12^2}$$

$$= \sqrt{81}$$

$$= 9 \text{ cm}$$

(ii) $\angle RQS = \dfrac{180° - 70°}{2}$

$$= 55°$$

$$\angle PQR = 90° + 55°$$

$$= 145°$$

$$\therefore \text{ kos } \angle PQR = \text{kos } 145°$$

$$= -0.8192$$

(b) (i) $\sin \theta = 0.5736$ ← θ terletak dalam sukuan I dan II.

Nilai sudut dalam sukuan I yang sepadan dengan θ
$= \sin^{-1} 0.5736$
$= 35°$

$\therefore \theta = 35°$ atau $\theta = 180° - 35°$
$\qquad\qquad\qquad\qquad = 145°$

(ii) kos $\theta = -0.3420$ ← θ terletak dalam sukuan II dan III.

Nilai sudut dalam sukuan I yang sepadan dengan θ
$= \text{kos}^{-1} 0.3420$
$= 70°$

$\therefore \theta = 180° - 70°$ atau $\theta = 180° + 70°$
$\qquad = 110°$ $\qquad\qquad\qquad = 250°$

(iii) tan $\theta = -0.4452$ ← θ terletak dalam sukuan II dan IV.

Nilai sudut dalam sukuan I yang sepadan dengan θ
$= \tan^{-1} 0.4452$
$= 24°$

$\therefore \theta = 180° - 24°$ atau $\theta = 360° - 24°$
$\qquad = 156°$ $\qquad\qquad\qquad = 336°$