

## Answer Key

### Paper 1

1. (a) 44.433  
(b) 44.4 (to 3 sig. fig.)
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2. (a) (i) 54  
(ii)  $x = 5$   
(iii) 1, -5
- 

3. M    W    B    G    Total  
8    :    6     $\underbrace{\hspace{2em}}$   
          3    :    1  
4    :    3    :    1            (112)

8 units = 112 visitors

1 unit =  $112/8 = 14$  visitors

= 14 children

Number of girls =  $14 - 3 = 11$

Number of men =  $4\text{units} \times 14 = 56$

Ratio of men to girls                    Ans- 56: 11

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4. (a) 4cm : 100m  
4cm :  $100 \times 100$   
      = 100 00cm  
1cm :  $100\ 00\text{cm}/4$   
**1 cm : 2500 cm**

**1 : 2500**

Ans- 1: 2500

4. (b)  $1 : 2500$

$1\text{cm} : 25\text{m}$

$(1\text{cm})^2 : (25\text{m})^2$

$1\text{ cm}^2 : 625\text{ m}^2$

$65\text{ cm}^2 : 625 \times 65 = 40625\text{ m}^2$

Ans: 40625 m<sup>2</sup>

5. Time taken =  $(5/12)\text{h} \times 60\text{ min}$

= 25min

Ans: 0025

6.

<p><b>Tap A,</b>  <b>5 min → 1 tank</b>  <b>1 min → <math>\frac{1}{5}</math> tank</b></p>	<p><b>Tap B,</b>  <b>10 min → 1 tank</b>  <b>1 min → <math>\frac{1}{10}</math> tank</b></p>
<p><b>Together,</b></p> <p><b>1 min → <math>\frac{1}{5} + \frac{1}{10} = \frac{3}{10}</math> tank</b></p> <p><b><math>\frac{3}{10}</math> tank → 1 min</b></p> <p><b>1 tank → <math>\frac{10}{3} = 3\frac{1}{3}</math> min</b></p> <p><b><u>Ans : <math>3\frac{1}{3}</math> min</u></b></p>	

7. Words typed in the first 1.5 minute =  $1.5(3x + 4) = (4.5x + 6)$  words

Words typed in the first 2.5 minute =  $2.5(2x + 4) = (5x + 10)$  words

Total words typed =  $4.5x + 5x + 6 + 10 = (9.5x + 16)$  words

Average speed →  $(9.5x + 16) / (1.5 + 2.5) = 2x + 7$

$(9.5x + 16) = 8x + 28$

$1.5x = 12$

Ans:  $x = 8$

8. (a)  $xr^2 + xyr^2 - xr^3$

**Ans =  $xr^2(1 + y - r)$**

8 (b)  $4c^2 = -4c + c^2$

$3c^2 + 4c = 0$

$c(3c + 4) = 0$

**Ans:  $c = 0$  or  $3c + 4 = 0$**

**$c = -4/3$**

9 (a)

$  \begin{array}{r}  2) \underline{120} \\  2) \underline{60} \\  2) \underline{30} \\  3) \underline{15} \\  5) \underline{5} \\  \underline{1}  \end{array}  $	$120 = 2^3 \times 3 \times 5$
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(b) Factors of 116: 1, 2, 4, 29, 58 and 116

Factors of 120: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 60 and 120

**Ans: 4**

$  \begin{array}{l}  120 = 2^3 \times 3 \times 5 \\  116 = 2^2 \times \underline{\quad} \times 29 \\  \underline{\text{HCF} = 2^2} = 4  \end{array}  $
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10 (a)

$  \begin{array}{l}  (5g^2)^3 \times \frac{5}{g} \\  = 125g^6 \times \frac{5}{g} \\  = \underline{\underline{625g^5}}  \end{array}  $
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(b)  $(3h^2 - 4)(h - 3)$

$= 3h^3 - 9h^2 - 4h + 12$

$= -6h^2 - 4h + 12$

**$= -2(3h^2 + 2h - 6)$**

(c)  $(4^3)^{2/3} = 4^x$   
 $4^2 = 4^x$   
**Ans:  $x = 2$**

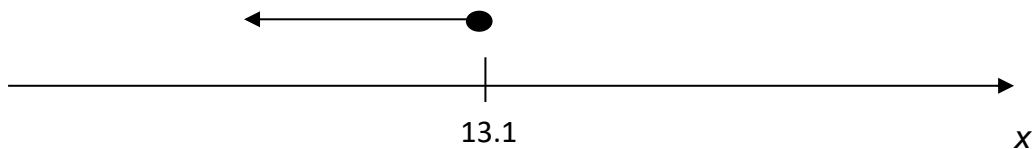
11 (a)  $xyw = xy - xw + 5wy$   
 $xyw - xy + xw = 5wy$   
 $x(yw - y + w) = 5wy$

**Ans:  $x = 5wy / (yw - y + w)$  or  $\frac{5wy}{wy - y + w}$**

(b)

$\frac{5wy}{wy - y + w} = \frac{5(-1)(2)}{(-1)(2) - 2 - 1} = 2$
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12 (a)  $19.6 \geq \frac{3}{2}x$   
 $x \leq 13.1$



(b)

$\begin{aligned} 6x(x + 1) &= 5x^2 \\ 6x^2 + 6x &= 5x^2 \\ 6x^2 - 5x^2 + 6x &= 0 \\ x^2 + 6x &= 0 \\ x(x + 6) &= 0 \\ x = 0 \text{ or } x &= -6 \end{aligned}$
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13. (a) P (die getting a 0) = 0

(b) P (a multiple of 2) =  $\frac{3}{6} = \frac{1}{2}$

14. (a) **-5°C**

(b) (i) **Wednesday** [ $35^{\circ}\text{C} - (-5^{\circ}\text{C}) = 40^{\circ}\text{C}$ ] (ii) **Saturday** ( $25^{\circ}\text{C} - 1^{\circ}\text{C} = 24^{\circ}\text{C}$ )

(c)  $1 + 2 + (-3) + 0 + (-5) = -5$

$$-5 / 5 = \underline{\mathbf{-1^{\circ}\text{C}}}$$

15. (a) **Ans:  $C = 2.8 + 0.66n$**

(b) Less flag-down fare =  $14.68 - 2.80 = 11.88$

$$\text{Ans: Distance} = 11.88 / 0.66 = \underline{\mathbf{18 \text{ km}}}$$

(c) Fare:  $2.8 + (33 \times 0.6) = \underline{\mathbf{\$22.60}}$

16. (a) Exterior angle =  $180^{\circ} - 144^{\circ} = 36^{\circ}$

$$\text{Number of sides} = 360^{\circ} / 36^{\circ} = \underline{\mathbf{10 \text{ sides}}}$$

(b) for the 8 interior angles, each has an exterior angle of  $30^{\circ}$ .

$$8 \times 30^{\circ} = 240^{\circ}$$

$$\text{Remaining exterior angle} = 360^{\circ} - 240^{\circ} = 120^{\circ}$$

$$\text{Remaining interior angle} = 180^{\circ} - 120^{\circ} = \underline{\mathbf{60^{\circ}}}$$

17 (a)(i) angle ABC =  $90^{\circ}$

$$\text{angle ABD} = 90^{\circ} - 75^{\circ} = \underline{\mathbf{15^{\circ}}}$$

(a)(ii) angle DAB =  $180^{\circ} - 36^{\circ} = \underline{\mathbf{144^{\circ}}}$

(b)  $\cos 75^{\circ} = 6 / \text{BD}$

$$\text{BD} = 6 / \cos 75^{\circ}$$

$$= 23.2 \text{ cm (1 dp)}$$

18. (a) **90^{\circ}** (tangent of circle is perpendicular to line passing through centre of circle)

(b) **90^{\circ}** (right angle triangle has one side as diameter of circle)

(c) **140^{\circ}** (angle at the centre is twice the angle at the circumference)

(d) **70°** (angles in the same segment are equal)

(e)  $90^\circ - 70^\circ = \underline{20^\circ}$

19.  $2000 - 2084 = (2000 \times r \times 3) / 100$

**r = 1.4%**

20. (a)

$$AB = \sqrt{(5 - (-2))^2 + (-3 - 11)^2} = \sqrt{245} = 15.7 \text{ units}$$

(b)

$$M_{AB} = \frac{11 - (-3)}{-2 - 5} = \frac{14}{-7} = -2$$

(c)  $y - (-5) = -2(x - 0)$

$$y + 5 = -2x$$

**y = -2x - 5**

21. (a) 15 min

(b)  $(6/20) \times 100\% = 30\%$

## Answer Key

### Paper 2

1.  $2x - 5y = 19$  -----(1)

$$3x + 7y = -15$$
 -----(2)

$$(1) \times 3: \quad 6x - 15y = 57$$
 -----(1a)

$$(2) \times 2: \quad 6x + 14y = -30$$
 -----(2a)

$$(2a) - (1a): \quad 6x + 14y - 6x + 15y = -30 - 57$$

$$29y = -87$$

$$y = -3$$
 -----(substitute into (1))

$$2x - 5(-3) = 19$$

$$2x + 15 = 19$$

$$\underline{x = 2, y = -3}$$

2.

(a)

$$100\% \rightarrow 2875$$

After 1<sup>st</sup> year, value of watch:

$$108\% \rightarrow \frac{2875}{100} \times 108 = 3105$$

After 2<sup>nd</sup> year, value of watch:

$$100\% \rightarrow 3105$$

$$108\% \rightarrow \frac{3105}{100} \times 108 = \$3353.40$$

$$\begin{aligned} \text{or Value} &= P \left( 1 + \frac{r}{100} \right)^n \\ &= 2875 \left( 1 + \frac{8}{100} \right)^2 = \$3353.40 \end{aligned}$$

(b)  $12x + 4y = 138$

$$\underline{6x + 2y = 69 \text{ (shown)}}$$

3. (a)  $y = k/9x^2$

$$2 = k / (9)(25)$$

$$k = 450$$

$$y = 450 / 9x^2$$

$$\underline{y = 50/x^2}$$

(b)

$$\begin{aligned} 2 &= \frac{50}{x^2} \\ x^2 &= \frac{50}{2} \\ x^2 &= 25 \\ x &= \pm 5 \end{aligned}$$

4. (a) million =  $1 \times 10^6$

$$14.65 \text{ million} = 14.65 \times 10^6$$

$$\underline{1.465 \times 10^7}$$

(b)  $1.465 \times 10^7 / 230\,000 = \$63.695$

$$= \underline{\$63.70}$$

5. (a)  $x + 7$

(b)  $23 + x + 7 = \underline{30 + x}$

(c)  $2(x + 7) = 30 + x$

$$2x + 14 = 30 + x$$

$$\underline{x = 16}$$

6. (a)  $1/3 \quad / \quad 5 = 1/15$

$$1/3 + 1/15 = 5/15 + 1/15 = 6/15 = \underline{2/5}$$



- (b) 7/15
- (c) 8/15
- (d)  $9/15 = \underline{3/5}$

7. (a) Speed =  $\frac{54 + 25}{2} = \underline{39.5 \text{ m/s}}$

(b) Deceleration from 10s to 30s:

$$\underline{\underline{\frac{25 - 54}{30 - 10} = -1.45 \text{ m/s}^2}}$$

Deceleration after 30s,

$$\begin{aligned} 2 \times -1.45 &= -2.9 \text{ m/s}^2 \\ \frac{0 - 25}{t - 30} &= -2.9 \text{ m/s}^2 \\ -25 &= -2.9t + 87 \\ 2.9t &= 87 + 25 = 112 \\ t &= 38.621 = \underline{38.6s} \text{ (3 sf)} \end{aligned}$$

(c) Total time = 38.621s

$$\begin{aligned} \text{Total distance} &= (54 \times 10) + (20 \times 25) + \left(\frac{1}{2} \times 20 \times 29\right) + \left(\frac{1}{2} \times 25 \times (38.621 - 30)\right) \\ &= 540 + 500 + 290 + 107.7625 \\ &= 1437.7625\text{m} = 1440 \text{ m (3 sf)} \end{aligned}$$

$$\text{Average speed} = 1437.7625 / 38.621 = 37.22747 = \underline{37.2 \text{ m/s}} \text{ (3 sf)}$$

8. (a) Volume of cylinder =  $(3.14) (2.5)^2 (8) = \underline{157\text{cm}^3}$

(b) Area =  $(0.5) \times 6 \times 7 = \underline{21 \text{ cm}^2}$

(c)  $21 \times L = 315$

$$L = 315 / 21 = \underline{15 \text{ cm}}$$

(d)  $315 / 157 = \underline{2}$  (round off)

9. (a)(i) Median =  $(32 + w)/2$   
 $32.5 = (32 + w)/2$   
 $w = 33$

(a)(ii) 17 kg

(a)(iii)

$$2 \text{ boxes} . \text{ Percentage} = \frac{2}{24} \times 100\% = 8\frac{1}{3}\%$$

10. (a)  $12a^2 - 6ab + 4ac - 2bc.$   
 $= 6a(2a - b) + 2c(2a - b)$   
 $= \underline{\underline{2(2a - b)(3a + c)}}$

(b)  $\frac{6x+1}{2} - \frac{4x}{3} = \frac{3(6x+1)}{6} - \frac{2(4x)}{6}$   
 $= \frac{18x+3}{6} - \frac{8x}{6}$   
 $= \frac{10x+3}{6}$

11. (a) Tax payable =  $\$3350 + \frac{11.5}{100} \times (115\,000 - 80\,000)$   
 $= \underline{\underline{\$7375}}$

(b) Chargeable income =  $\$65\,000 - \$200 - \$300 - \$2000 - 4(\$1500) - (\$4500)$   
 $= \underline{\underline{\$52\,000}}$   
(only has to support the mother)  
Tax payable  
 $= \$550 + \frac{7}{100}(52000 - 40000)$   
 $= \$550 + \$840$   
 $= \underline{\underline{\$1390}}$

12. (a) Using AAA,  
angle BFC = angle DFE (vertically opposite angles)  
Angle BCF = angle DEF (alternate angles, BC // ED)  
Angle EDB = angle CBD (alternate angles, BC // ED)  
Hence triangle BCF and triangle DEF are similar

(b)  $3DE = 5BC$   
 $\frac{BC}{DE} = \frac{3}{5} = \frac{CF}{EF}$   
 $\frac{3}{5} = \frac{6.3}{EF}$   
 $\underline{\underline{EF = 10.5 \text{ cm}}}$

$$(c)(i) \quad \text{area of triangle } BCF = (3)^2 = \boxed{9}$$

$$\text{area of triangle } DEF = (5)^2 = \boxed{25}$$

$$(c)(ii) \quad \text{area of triangle } BCF = \boxed{3}$$

$$\text{area of triangle } FCD = \boxed{5}$$

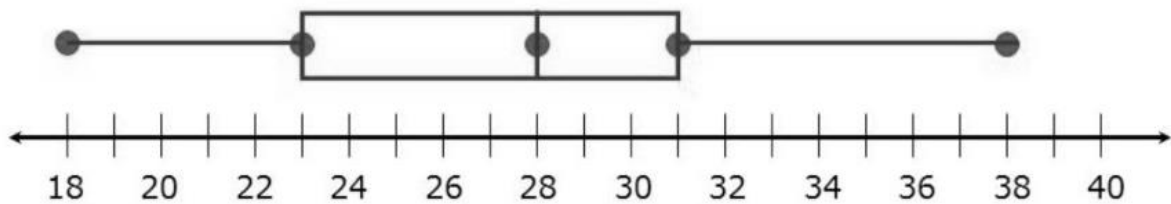
$$(c)(iii) \quad \text{area of triangle } DEF = 25$$

$$\text{area of triangle } FCD = 15$$

$$\text{area of triangle } BCF = \boxed{9}$$

$$\text{area of parallelogram } ACDE = \boxed{80}$$

13 (a)



(b) Range =  $38 - 18 = \underline{20}$

14. (a)(i) Since  $AB^2 + AC^2 = 25 + 144 = 169 = 13^2$

$AB^2 + AC^2 = BC^2$  (By Pythagora's Theorem, angle BAC is right-angled.)

(ii)  $AD/AC = AE/AB$   
 $(5 + BD) / 12 = (12 + 4) / 5$   
 $25 + 5BD = 192$   
 $5BD = 167$

**BD = 33.4 cm**

(iii)  $DE = \text{sqrt} [ (33.4 + 5)^2 + (12 + 4)^2 ] = 41.6 \text{ cm}$

$\cos \text{ angle ADE} = (33.4 + 5) / 41.6$

**cos angle ADE = 12/13**

(b) By pythagora's theorem,

$$(2x)^2 + (3x)^2 = (\sqrt{52})^2$$

$$4x^2 + 9x^2 = 52$$

$$13x^2 = 52$$

$$x^2 = 4$$

$$\underline{\mathbf{x = 2 (reject -2)}}$$

15. (a)(i) **34.5**

(a)(ii) **15**

$$\frac{25}{100} \times 120 = 30$$

**Lower quartile, LQ = 26.5**

$$\frac{75}{100} \times 120 = 90$$

**Upper quartile, UQ = 41.5**

**Interquartile range, IQR = 41.5 - 26.5 = 15**

(a)(iii) **44 kg**

$$\frac{80}{100} \times 120 = 96$$

(a)(iv) **10 students**

(a)(v) **24**

$$(a)(vi) \left(\frac{16}{120}\right) \left(\frac{10}{119}\right) = \left(\frac{160}{142800}\right) = \left(\frac{2}{1785}\right)$$