

Intermediate 2 Units 1, 2, 3 Paper 2 2007

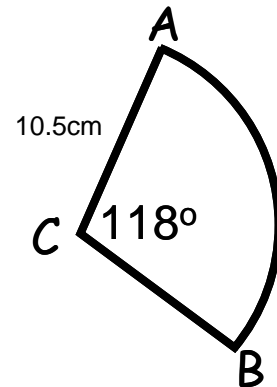
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1. Given Ian's annual salary is £28 400 and he gets a 2.3% increase per annum. His salary after 3 years will be:

$$\text{Salary} = 28400(1.023)^3 = \text{£}30405 \text{ to nearest } \text{£}$$

2. Given the diagram the length of the arc AB is:

$$\begin{aligned} L_{\text{arc}AB} &= \frac{118}{360} \times \pi \times 2 \times 10.5 \\ &= 21.6\text{cm} \end{aligned}$$

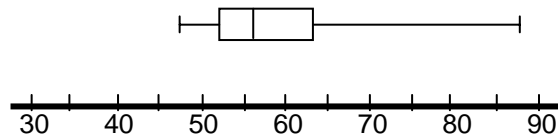


3. Given the back to back stem and leaf diagram.

Girls		Boys
1	3	
9	4	7 9
8 7 4 3 2	2	2 3 4 4 6 6 7 9
9	4	6 3
9	6	7 4 8
8	1	8 7
n = 15		n = 14

3	7	7	represents 73%
	8	7	represents 87%

- (a) The box plot given is for the boys because it starts at 47.



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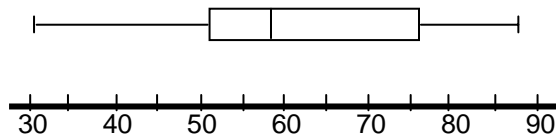
Q3. (b) For the girls

The median is 58%

The lower quartile is 52%

The upper quartile is 76%

(c) The box plot for the girls is:



(d) An appropriate comment: Girls marks are more variable than the boys.

Q4. Given that PQ is tangent to the circle at T.

The size of the angle MOT is:

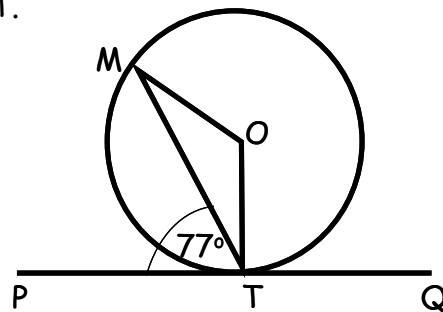
Angle PTO = 90°

Angle MTO is $90^\circ - 77^\circ = 13^\circ$

Triangle MOT is isosceles.

Angle MTO = OMT = 13°

Finally angle MOT is $180^\circ - 26^\circ = 154^\circ$

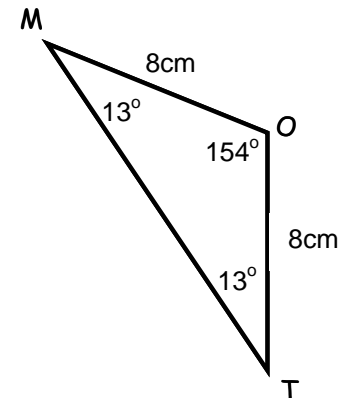


Q4. (b) Using the Sine Rule the length of MT is:

$$\frac{o}{\sin 154^\circ} = \frac{8}{\sin 13^\circ}$$

$$o = \frac{8 \times \sin 154^\circ}{\sin 13^\circ}$$

$$o = 15.6 \text{ cm}$$



Q5. The volume of water in the tank is:

Big cone - small cone

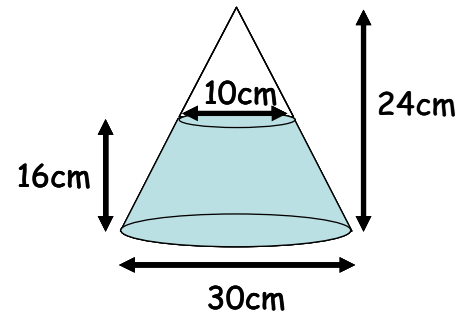
$$V = \frac{1}{3} \pi r_b^2 h_b - \frac{1}{3} \pi r_s^2 h_s$$

$$= \frac{1}{3} \times \pi \times (15)^2 \times (24) - \frac{1}{3} \times \pi \times (5)^2 \times (8)$$

$$= 5652 - 209.3$$

$$= 5442.7$$

$$= 5400 \text{ to 2 sign. figs.}$$



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Q6. The probability of getting a number less than 7 when rolling a dice is:

$$P(< 7) = \frac{\text{Number of favourable events}}{\text{Total Number of events}} = \frac{6}{6} = 1 \quad \text{Answer D}$$

Q7. (a) Factorising we get:

$$\begin{aligned} 2x^2 - 18 &= 2(x^2 - 9) \\ &= 2(x - 3)(x + 3) \end{aligned}$$

(b) Simplifying we get:

$$\frac{(2x + 5)^2}{(2x + 1)(2x + 5)} = \frac{(2x + 5)}{(2x + 1)}$$

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Q8. Solving the equation we get:

$$2x^2 - 6x - 5 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{36 - 4 \times 2 \times (-5)}}{2 \times 2}$$

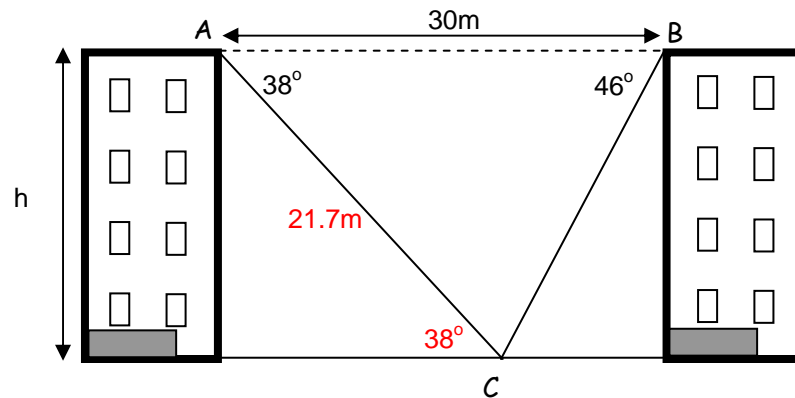
$$x = \frac{6 \pm \sqrt{76}}{4}$$

$$x = \frac{6 + \sqrt{76}}{4} \quad \text{and} \quad x = \frac{6 - \sqrt{76}}{4}$$

$$x = 3.679 \quad \text{and} \quad x = -0.679$$

$$x = 3.7 \quad \text{and} \quad x = -0.7$$

Q9. Given the diagram:



The height of the building is given by:
Using Sine Rule

$$\frac{\text{hyp}}{\sin 46^\circ} = \frac{30}{\sin 96^\circ}$$

$$o = \frac{30 \times \sin 46^\circ}{\sin 96^\circ}$$

$$o = 21.7\text{m}$$

Using SOHCAHTOA:

$$\sin(38^\circ) = \frac{h}{21.7}$$

$$h = 21.7 \times \sin(38^\circ)$$

$$h = 13.4\text{m}$$

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Q10. Expressing $\frac{5p^2}{8} \div \frac{p}{2}$ as a single fraction in its simplest form:

$$\frac{5p^2}{8} \div \frac{p}{2} = \frac{5p^2}{8} \times \frac{2}{p} = \frac{5p}{4}$$

Q11. Change the subject of the formula to m we get:

$$K = \frac{m^2 n}{p}$$

$$Kp = m^2 n$$

$$\frac{Kp}{n} = m^2$$

$$m^2 = \frac{Kp}{n}$$

$$m = \sqrt{\frac{Kp}{n}}$$

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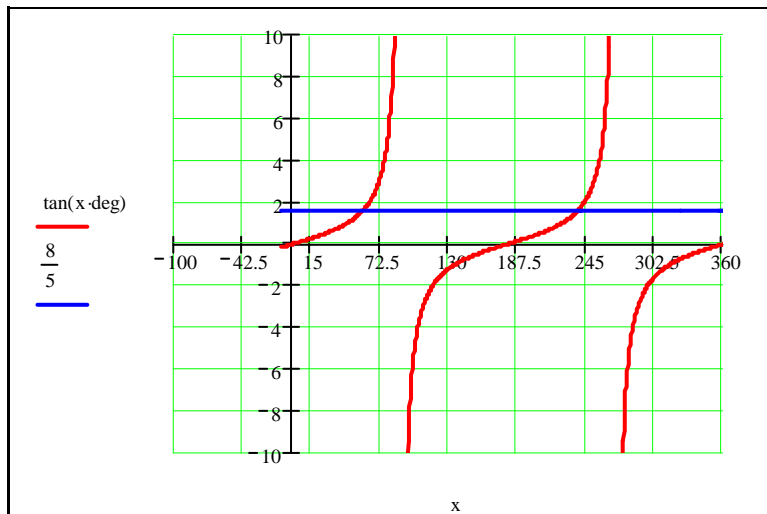
Q12. Solving the equation we get:

$$5 \tan x^\circ - 6 = 2 \quad 0 \leq x^\circ \leq 360^\circ$$

Remember there will be 2 solutions in the range $0 \leq x^\circ \leq 360^\circ$

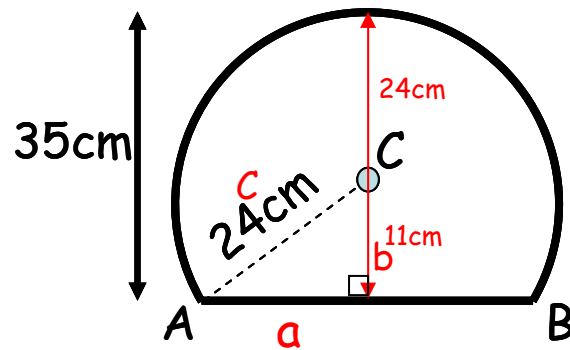
$$\tan x^\circ = \frac{8}{5}$$

$$x^\circ = \tan^{-1}\left(\frac{8}{5}\right) = 58^\circ \quad \text{and} \quad 180^\circ + 58^\circ = 238^\circ$$



Q14. Given the diagram of the mirror.

Red text have been added to diagram.



The base of the mirror is given by:

Using Pythagoras:

$$a^2 = c^2 - b^2$$

$$a^2 = \sqrt{24^2 - 11^2}$$

$$a = \sqrt{455}$$

$$a = 21.3$$

Hence the base is $2 \times 21.3 = 42.6\text{cm}$