

# Perth Academy



Mathematics

Intermediate 2

2001

Paper 1

Written Answers

Lat 2 2001 Paper 1.

1)  $x^2 + 2x - 15$

$(x + 5)(x - 3)$

2) Two points  $\Rightarrow (0, 5)$  &  $(2, 25)$

Gradient =  $\frac{25-5}{2-0} = \frac{20}{2} = 10$

Cuts y-axis at 5

$y = mx + c$   
↑ Gradient      ↙ cuts y-axis

$\therefore y = 10x + 5$

3)

$2x + y = 5$       ①

$x - 3y = 6$       ②

①  $2x + y = 5$

②  $\times 2$   $2x - 6y = 12$       -

$7y = -7$

$y = -1$

$\therefore x = 3$

$$4) \quad P = R^2 b - 5$$

$$P + 5 = R^2 b \quad (+5)$$

$$\frac{(P+5)}{b} = R^2 \quad (\div b)$$

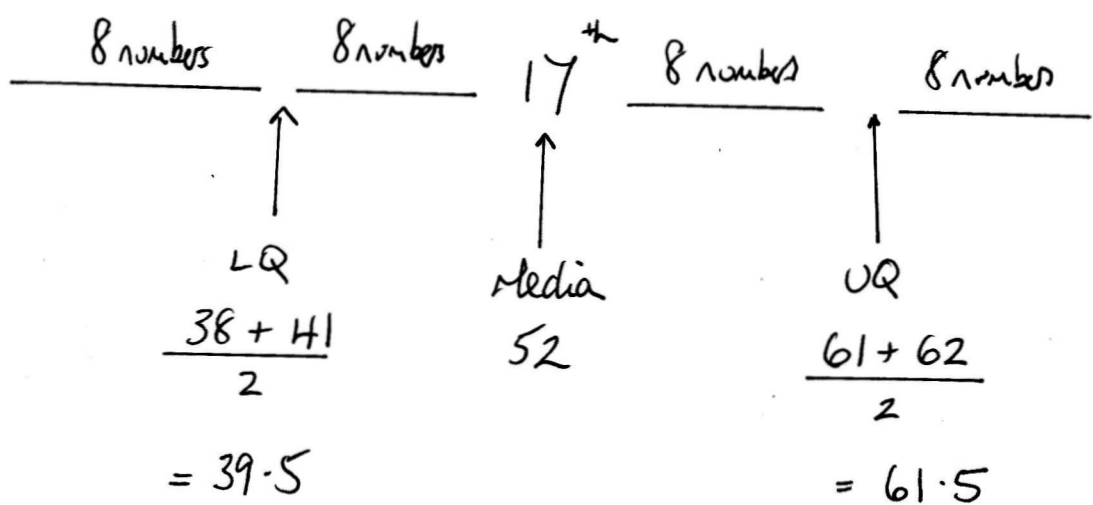
$$\sqrt{\frac{(P+5)}{b}} = R \quad (\sqrt{\quad})$$

5) a) (i) Median - middle when in order

$n = 33 \therefore$  Median will be  $17^{\text{th}}$  Number.

$\therefore$  Median = 52

(ii) Quartiles are always symmetrical.



(iii) Semi-Interquartile =  $\frac{61.5 - 39.5}{2} = 11$

5) cont..

b) 33 Customers.  
2 Spent more than 80p.

$$\therefore \text{Probability} = \frac{2}{33}$$

6)

$$y = \cos bx$$

↑  
Number of cycles.

$$\therefore b = 3$$

7)

$$\text{Perimeter of square} = 4(2x+2)$$

$$\therefore \text{Length} = 4(2x+2) - 2(x+3)$$

$$= 8x + 8 - 2x - 6$$

$$= 6x + 2$$

$$= 2(3x+1)$$

2 lengths needed, so each length  
will be  $(3x+1)$  cm

$$p) a) \quad \frac{3}{x} - \frac{5}{(x+2)} \quad \left( \text{need to have the same denominator} \right)$$

$$= \frac{3(x+2)}{x(x+2)} - \frac{5x}{x(x+2)}$$

$$= \frac{3(x+2) - 5x}{x(x+2)} = \frac{3x + 6 - 5x}{x(x+2)}$$

$$= \frac{6 - 2x}{x(x+2)}$$

$$b) \quad \sqrt{18} - \sqrt{2} + \sqrt{72}$$

$$\Rightarrow \sqrt{9} \times \sqrt{2} - \sqrt{2} + \sqrt{9} \times \sqrt{8}$$

$$= 3\sqrt{2} - \sqrt{2} + 3\sqrt{8}$$

$$= 3\sqrt{2} - \sqrt{2} + 3 \times \sqrt{4} \times \sqrt{2}$$

$$= 3\sqrt{2} - \sqrt{2} + 3 \times 2 \times \sqrt{2}$$

$$= 3\sqrt{2} - \sqrt{2} + 6\sqrt{2}$$

$$= 8\sqrt{2}$$

# Perth Academy



Mathematics

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Paper 2

Written Answers

Int 2 2001 Paper 2.

$$1) \quad Y_{R1} \quad 528000 \times 1.024 = 540672$$

$$Y_{R2} \quad 540672 \times 1.024 = 553648$$

$$Y_{R3} \quad 553648 \times 1.024 = 566935$$

$$Y_{R4} \quad 566935 \times 1.024 = 580542$$

Population = 581 000 (nearest '000)

$$2) \quad a) \quad \text{Mean} = \frac{73 + 47 + 59 + 71 + 48 + 62}{6}$$

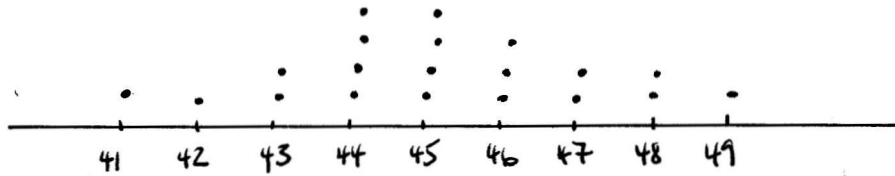
$$\text{Mean} = \frac{360}{6} = 60$$

$x$	$\bar{x}$	$x - \bar{x}$	$(x - \bar{x})^2$
73	60	13	169
47	60	-13	169
59	60	-1	1
71	60	11	121
48	60	-12	144
62	60	2	4
			<hr/>
			608

$$S.D.) = \sqrt{\frac{608}{6-1}} = \sqrt{\frac{608}{5}} = 11$$

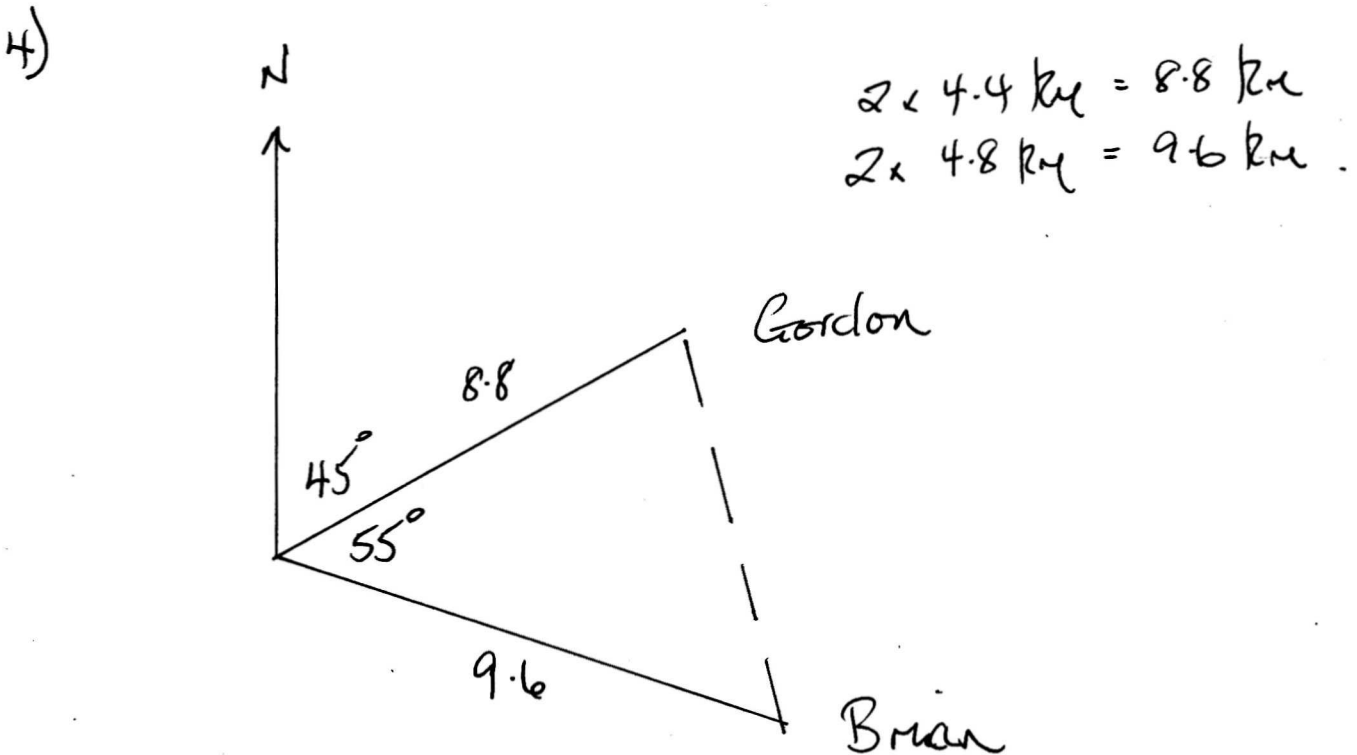
b) Group B marks were not as consistent.

3) a)



b) Normal distribution.

c) 45 matches.



Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

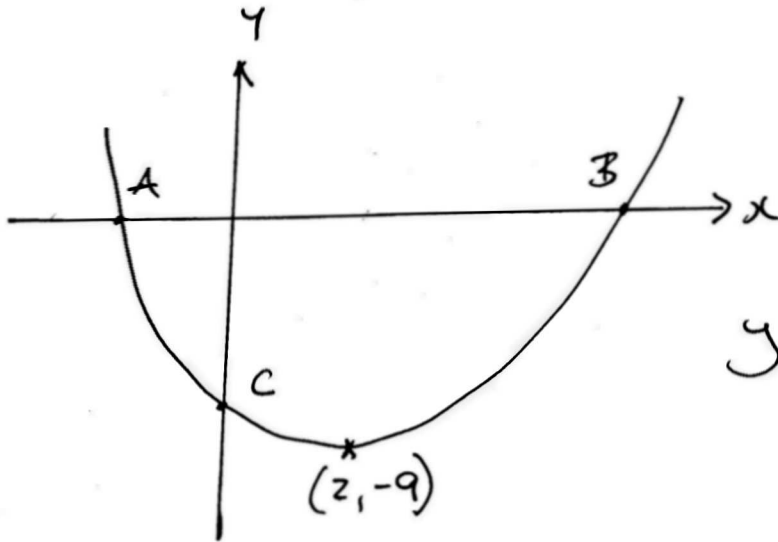
$$\Rightarrow a^2 = 8.8^2 + 9.6^2 - 2 \times 8.8 \times 9.6 \times \cos 55^\circ$$

$$a^2 = 169.6 - 96.9 = 72.7$$

$$\therefore a = 8.5 \text{ km}$$



5)



$$y = (x-2)^2 - 9$$

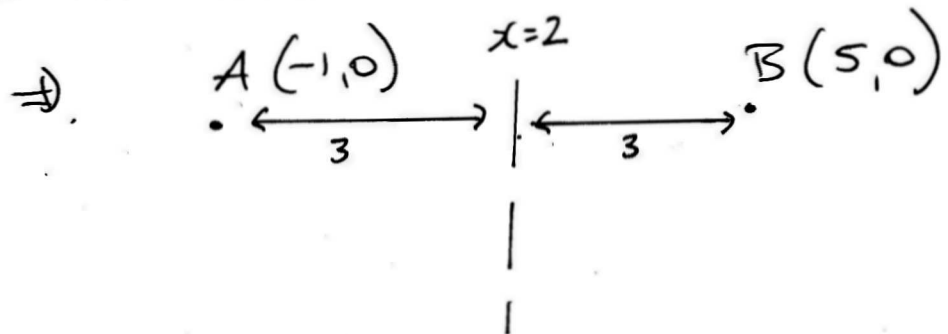
a) Minimum turning point will be  $(2, -9)$

b) At point C  $x = 0$

$$\Rightarrow y = (0-2)^2 - 9 = 4 - 9 = -5$$

$$C(0, -5)$$

c) Remember: parabolas are symmetrical



6) a) Volume of a cylinder =  $\pi r^2 \times h$

$$\text{Volume} = 3.14 \times 20^2 \times 50$$

$$\Rightarrow \text{Volume} = 62800 \text{ cm}^3$$

$$\Rightarrow \text{Volume} = 63000 \text{ cm}^3$$

(2 sig fig)

b)

If 800 cups filled from container,

then each cup has  $\Rightarrow \frac{62800}{800} = 78.5 \text{ cm}^3$

$$\text{Volume of cone} = \frac{1}{3} \times \pi \times r^2 \times h$$

$$\Rightarrow 78.5 = \frac{1}{3} \times 3.14 \times 3^2 \times h$$

$$\therefore h = \frac{78.5}{9.42} = 8\frac{1}{3} \text{ cm}$$

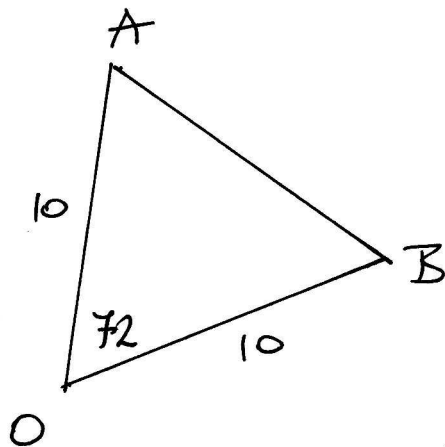
7)

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

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

$$= 2x^3 + 11x^2 + 11x - 4$$

8) Consider one of the triangles



$$\begin{aligned}\angle AOB &= \frac{360}{5} \\ &= 72^\circ\end{aligned}$$

$$\begin{aligned}\text{Area of triangle} \\ &= \frac{1}{2} ab \sin C\end{aligned}$$

$$\begin{aligned}\Rightarrow \text{Area of } \triangle AOB &= \frac{1}{2} \times 10 \times 10 \times \sin 72^\circ \\ &= 50 \times \sin 72 = 47.55 \text{ cm}^2\end{aligned}$$

$$\text{Total Area} = 5 \times 47.55 = 237.8 \text{ cm}^2$$

$$9) a) a^2 (2a^{-1/2} + a)$$

$$= 2a^{2+(-1/2)} + a^{2+1}$$

$$= 2a^{3/2} + a^3$$

a) b)

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

$$3x^2 + 3x - 7 = 0$$

$\uparrow$        $\uparrow$        $\uparrow$   
 a      b      c

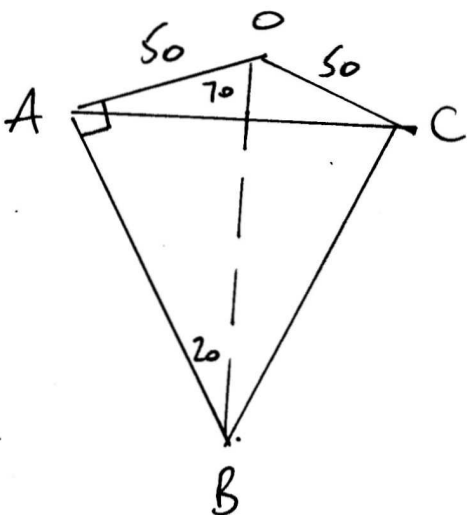
$$\Rightarrow a = 3 \quad b = 3 \quad c = -7.$$

$$\Rightarrow \frac{-3 \pm \sqrt{3^2 - 4 \times 3 \times -7}}{2 \times 3} = \frac{-3 \pm \sqrt{93}}{6}$$

$$\Rightarrow x = 1.1 \quad \text{or} \quad x = -2.1$$

b) Distance from A to C around circle

$$\Rightarrow \pi \times d \times \frac{220}{360} = 191.9 \text{ cm}$$



SOH CAH TOA

Find AB

$$\tan 20^\circ = \frac{50}{AB}$$

$$\therefore AB = \frac{50}{\tan 20^\circ}$$

$$= 137.4$$

$$\text{Total Perimeter} = 191.9 + 137.4 + 137.4$$

$$= 466.7 \text{ cm}$$

$$11) a) \quad 4 \tan x^\circ + 5 = 0$$

$$\Rightarrow 4 \tan x = -5$$

✓ S	A
T	✓ C

$$\Rightarrow \tan x = -5/4$$

$$\therefore x = 180 - 51.3^\circ \\ = 128.7^\circ$$

or

$$x = 360 - 51.3^\circ \\ = 308.7^\circ$$

$$\tan^{-1} 5/4 \\ = 51.3^\circ$$

b)

Remember  $\tan x = \frac{\sin x}{\cos x}$

$$\Rightarrow \tan x \cos x$$

$$= \frac{\sin x}{\cos x} \times \frac{\cos x}{1}$$

$$= \frac{\sin x \cos x}{\cos x} = \sin x$$

∴ They are the same.