

# Perth Academy



Mathematics

Intermediate 1

2002

Paper 1

Non-Calculator

Answers

1. (a) Find  $5.22 \div 9$ .

$$\begin{array}{r} 0.58 \\ 9 \overline{) 5.22} \end{array}$$

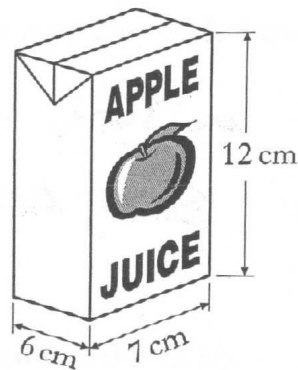
1

(b) Find  $\frac{2}{5}$  of £80.

$$\frac{1}{5} = \frac{\pounds 80}{5} = \pounds 16 \quad \therefore \frac{2}{5} = 2 \times \pounds 16 = \pounds 32$$

1

2. Find the volume of this cuboid.



$$\text{Volume} = l \times b \times h$$

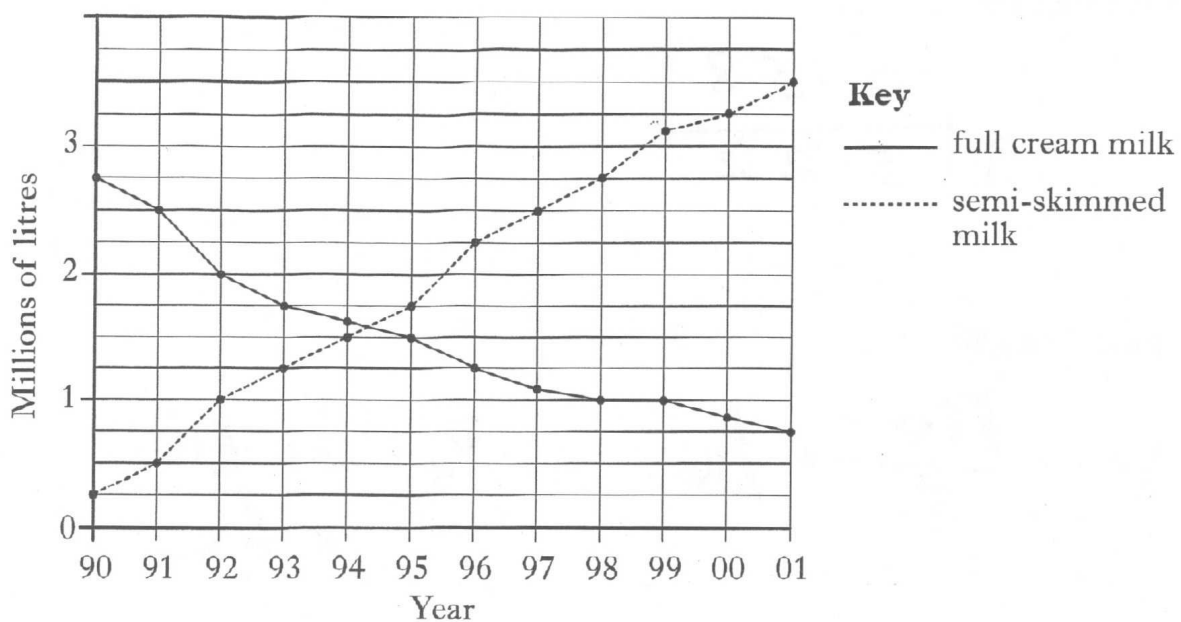
$$= 12 \times 7 \times 6$$

$$= 84 \times 6$$

$$= 504 \text{ cm}^3$$

2

3. The graph shows the amount of full cream and semi-skimmed milk sold by a supermarket from 1990 to 2001.



- (a) How much semi-skimmed milk was sold in 1991?

0.5 million litres  
= 500,000 litres

1

- (b) Describe the trend in sales of **both** kinds of milk.

Sales of full cream have declined  
Sales of semi-skimmed have increased

1

4. This information appears on a box of chocolates.

<b>Nutritional Information</b>	
<b>per 100 grams</b>	
Energy	489 kJ
Protein	6.28 g
Carbohydrate	57.1 g
Fat	25.6 g

How much fat is in 300 grams of the chocolates?

25.6g → 100g of chocolate

So  $3 \times 25.6g = 76.8g$

5. Geeta is buying a new car. Her local garage has the following special offer on new cars.



Choose any **THREE** of these items up to a maximum value of £850

<i>CD player</i>	£150
<i>Air Conditioning</i>	£300
<i>One year's Insurance</i>	£400
<i>Central Locking</i>	£200
<i>Electric Sunroof</i>	£350

- (a) One combination of items is shown in the table below.

<i>CD player</i>	<i>Air Conditioning</i>	<i>One year's Insurance</i>	<i>Central Locking</i>	<i>Electric Sunroof</i>	<i>Total Value</i>
✓		✓	✓		£750
✓	✓	✓			£850
✓	✓			✓	£800
✓			✓	✓	£700
	✓		✓	✓	£850
✓	✓		✓		£650

Complete the table to show **all** the possible combinations of items available under this special offer.

3

- (b) Geeta wants all five of these items.

She is willing to pay for the extra two items.

What is the least amount she must pay?

Total Cost of items £1400

So £1400 - £850 = £550

2

6. Solve algebraically the equation

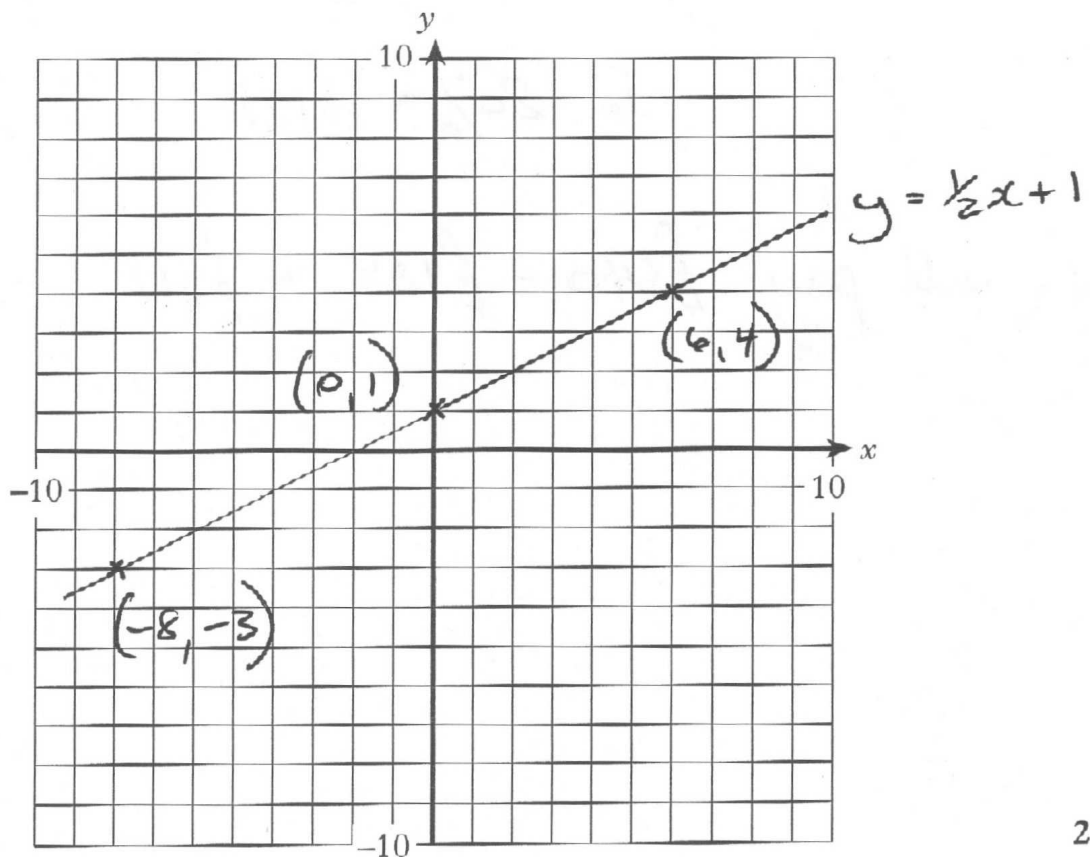
$$5y + 7 = 19 - y.$$

$$\begin{aligned} 5y + y + 7 &= 19 - y + y && (+y \text{ each side}) \\ 6y + 7 - 7 &= 19 - 7 && (-7 \text{ each side}) \\ 6y &= 12 && \therefore y = 2 \end{aligned}$$

7. (a) Complete the table below for  $y = \frac{1}{2}x + 1$ .

x	-8	0	6
y	-3	1	4

(b) Draw the line  $y = \frac{1}{2}x + 1$  on the grid.



8. The full premium for John to insure his car last year was £480.  
This year the premium has increased by one third.  
John also receives a 20% discount on **this year's** premium.  
How much will John pay to insure his car this year?

$$\frac{1}{3} \text{ of } £480 \Rightarrow \begin{array}{r} 160 \\ 3 \overline{) 480} \end{array}$$
$$= £160$$

$$\text{New premium} = £480 + £160 = £640$$

$$20\% \text{ discount} \quad 10\% = £64$$

$$\text{So } 20\% = £128$$

$$\text{John will pay } £640 - £128 = £512$$

9. The attendances at six football matches are listed below.

7000    10000    64000    11000    10000    12000

(a) Find the mean attendance.

(Mean: add up and divide by how many numbers there are.)

$$\begin{aligned} \text{So } & \frac{7000 + 10000 + 64000 + 11000 + 10000 + 12000}{6} \\ & = \frac{114000}{6} = 19000 \end{aligned} \quad 2$$

(b) Find the median attendance.

(Median: middle value when in order.)

$$\begin{aligned} \text{So } & 7000 \quad 10000 \quad 10000 \quad 11000 \quad 12000 \quad 64000 \\ & \qquad \qquad \qquad \uparrow \\ & \qquad \qquad \qquad 10500 \text{ Median} \end{aligned} \quad 2$$

(c) Which of the averages gives a truer picture of the above attendances — the mean or the median?

Give a reason for your answer.

Median because the 64000 gives the mean value a value which is not representative.



10. Evaluate  $3ab - c$  when  $a = -1$ ,  $b = 2$  and  $c = -10$ .

$$3ab - c \Rightarrow 3 \times -1 \times 2 - (-10)$$

$$= -6 + 10 = 4.$$

Be careful of  
double negatives

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Paper 2

Calculator

Answers

1. A letter is chosen at random from the letters of the word

**MATHEMATICS.**

What is the probability that the chosen letter is M?

$$P(M) = \frac{2}{11}$$

← number of M's

← number of letters

1

2. The wavelength of visible blue light is 0.000 072 centimetre.  
Write this number in standard form.

$$7.2 \times 10^{-5}$$

↑ must be between 1 and 10.

2

3. The number of copies of "The Anglers Weekly" magazine sold by a newsagent was recorded for 16 weeks.

✓ 25   ✓ 23   ✓ 19   ✓ 22   ✓ 18   ✓ 45   ✓ 38   ✓ 23  
✓ 32   ✓ 25   51   ✓ 27   23   ✓ 30   ✓ 28   ✓ 42

- (a) Complete this stem and leaf diagram using the data above.

1		8	9						
2		2	3	3	3	5	5	7	8
3		0	2	8					
4		2	5						
5		1							

1|8 represents 18 magazines

2

- (b) Find the mode for this data set.

The mode is the most common

So the mode is 23

1

4. Jane is going to Switzerland and wants to change £500 into Swiss francs. Two travel agents offer the following exchange rates.

<b>TRAVELSUN</b>
£1 = 2.46 Swiss francs
No commission

<b>SOLLAIR</b>
£1 = 2.50 Swiss francs
2% commission payable

- (a) How many Swiss francs would Jane receive from Travelsun for £500?

$$2.46 \times \text{£}500 = 1230$$

1

- (b) Which travel agent will give Jane more Swiss francs for her £500?  
Show clearly all your working.

SOLLAIR

$$2.50 \times \text{£}500 = 1250$$

$$1\% = 12.5 \text{ so } 2\% = 25$$

$$\text{So final amount} = 1250 - 25 = 1225.$$

So Travelsun will give best deal

4

5. (a) Multiply out the brackets and simplify

$$5 + 4(2m - 3).$$

$$= 5 + 8m - 12$$

$$= 8m - 7$$

2

(b) Factorise  $21 - 7t$ .

$$21 - 7t = 7(3 - t)$$

2

6. Ali drove overnight 406 miles from Galashiels to Portsmouth to catch a ferry to France.  
 His average speed for the journey was 56 miles per hour.  
 He arrived in Portsmouth at 0630.  
 At what time did he leave Galashiels?

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{406}{56} = 7.25.$$

So he left Galashiels  
 at 2315

This is  
 7 hours 15 mins

4

7. A group of students was asked how many times they had visited a cinema during the last month.  
 The results are shown in this frequency table.

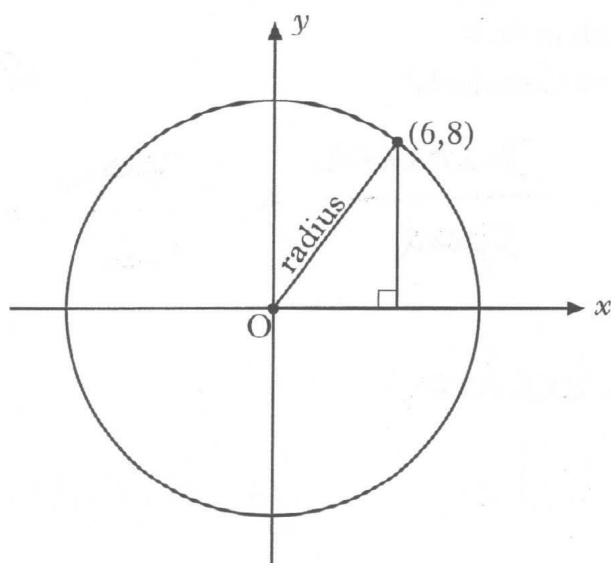
Number of visits	Frequency	Visits $\times$ Frequency
0	104	0
1	56	56
2	44	88
3	20	60
4	10	40
5	1	5
Total = 235		Total = 249

Complete the table above and find the mean number of visits.  
 Give your answer correct to 1 decimal place.

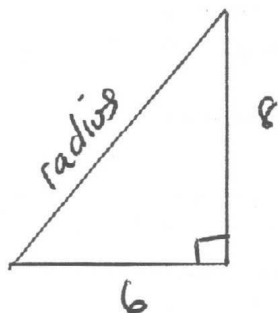
$$\text{Mean} = \frac{249}{235} = 1.1 \text{ visits a month}$$

3

8. The circle shown below has centre  $(0,0)$ .  
The point  $(6,8)$  lies on the circle.



Work out the area of this circle. (Use Pythagoras)



$$\begin{aligned} \text{radius} &= \sqrt{6^2 + 8^2} \\ &= \sqrt{100} = 10 \end{aligned}$$

$$\text{Area} = \pi r^2 = 3.14 \times 100 = 314 \text{ units}^2$$

9. Solve algebraically the inequality

$$4p + 3 < 27.$$

$$4p + 3 - 3 < 27 - 3 \quad (-3 \text{ each side})$$

$$4p < 24 \quad (\div 4 \text{ each side})$$

$$p < 6$$



10. An art dealer paid £120 for an oil painting.  
He sold it for £150.

Express the profit as a percentage of what he paid for the painting.

$$\text{Profit} = £150 - £120 = £30.$$

$$\% \text{ Profit} = \frac{30}{120} \times 100 = 25\%.$$

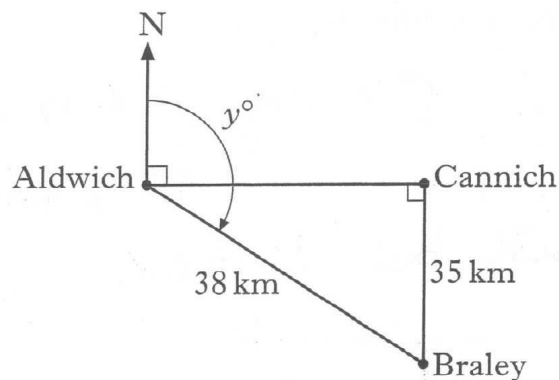
4

11. The diagram shows the positions of three towns.

Braley is 38 kilometres from Aldwich.

Cannich is due east of Aldwich.

Braley is 35 kilometres due south of Cannich.



Calculate  $y^\circ$ , the bearing of Braley from Aldwich.  
Do not use a scale drawing.

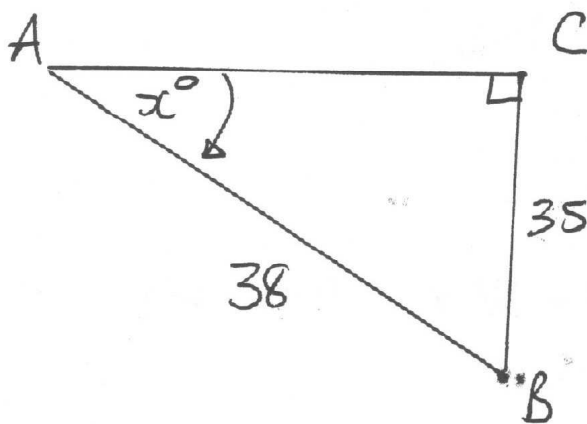
Use SOHCAHTOA

$$\sin x^\circ = \frac{35}{38}$$

$$\therefore x = 67^\circ$$

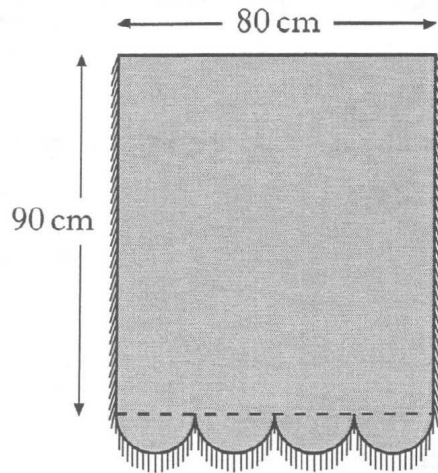
So bearing will be

$$90 + 67 = 157^\circ$$



12. This window blind is in the shape of a rectangle with four equal semi-circles at the bottom.

It has braid down the two sides and round the bottom.

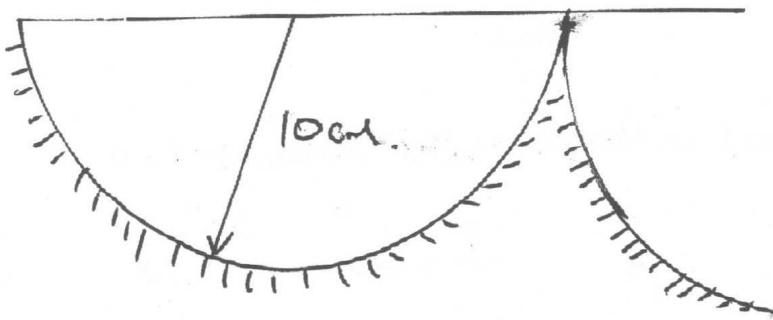


Calculate the total length of braid needed for this blind.

Give your answer to the nearest centimetre.

$$\text{Radius} = 10\text{cm} \quad \therefore C = \pi d = 3.14 \times 20 = 62.8$$

Half of this will be 31.4 cm



Bottom of  
blind

5

Total length of braid

$$= 90 + 90 + 31.4 + 31.4 + 31.4 + 31.4 \text{ cm}$$

$$= 305.6 \text{ cm}$$

$$= 306 \text{ cm}$$

13. Body mass index is a measure of weight compared to height.

The body mass index,  $B$ , of a person who weighs  $w$  kilograms and whose height is  $h$  metres is given by the formula

$$B = \frac{w}{h^2}$$



- (a) Calculate the value of  $B$  for a person who weighs 70 kilograms and is 1.68 metres tall.

$$\begin{aligned} B &= \frac{70}{(1.68)^2} = \frac{70}{1.68 \times 1.68} \\ &= 24.8 \end{aligned}$$

3

- (b) Tom is 1.55 metres tall.  
His body mass index is 25.  
Find his weight.

$$B = \frac{w}{h^2}$$

$$\therefore w = B \times h^2 \Rightarrow w = 25 \times 1.55^2$$

$$\begin{aligned} w &= 25 \times 1.55 \times 1.55 \\ &= 60.1 \text{ kg} \end{aligned}$$

2