

Write your name here

Surname

Other Names

# Mathematics

## Paper 1 (Non-Calculator) Foundation Tier

Time: 1 hour 30 minutes

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



### Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – use this as a guide as to how much time to spend on each question.

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

## Foundation Tier Formulae Sheet

### Perimeter, area and volume

Where  $a$  and  $b$  are the lengths of the parallel sides and  $h$  is their perpendicular separation:

$$\text{Area of a trapezium} = \frac{1}{2}(a + b) h$$

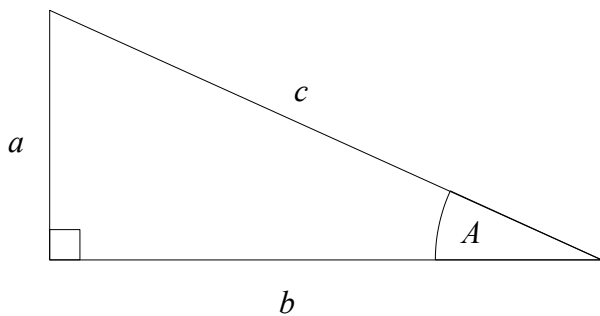
Volume of a prism = area of cross section  $\times$  length

Where  $r$  is the radius and  $d$  is the diameter:

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

### Pythagoras' Theorem and Trigonometry



In any right-angled triangle where  $a$ ,  $b$  and  $c$  are the length of the sides and  $c$  is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle  $ABC$  where  $a$ ,  $b$  and  $c$  are the length of the sides and  $c$  is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

### Compound Interest

Where  $P$  is the principal amount,  $r$  is the interest rate over a given period and  $n$  is number of times that the interest is compounded:

$$\text{Total accrued} = P \left( 1 + \frac{r}{100} \right)^n$$

### Probability

Where  $P(A)$  is the probability of outcome  $A$  and  $P(B)$  is the probability of outcome  $B$ :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

**END OF EXAM AID**

1 Write 0.9 as a fraction

$$\frac{9}{10}$$

(Total for Question 1 is 1 mark)

2 Change 45 centimetres into millimetres

$$1 \text{ cm} = 10 \text{ mm}$$

$$450 \text{ millimetres}$$

(Total for Question 2 is 1 mark)

3 Simplify  $5 \times a \times 2$

$$10a$$

(Total for Question 3 is 1 mark)

4 Work out  $\frac{1}{6}$  of 300

$$300 \div 6 = 50$$

$$50$$

(Total for Question 4 is 1 mark)

5 30 children were asked which sport they wanted to play.

Here are the results.

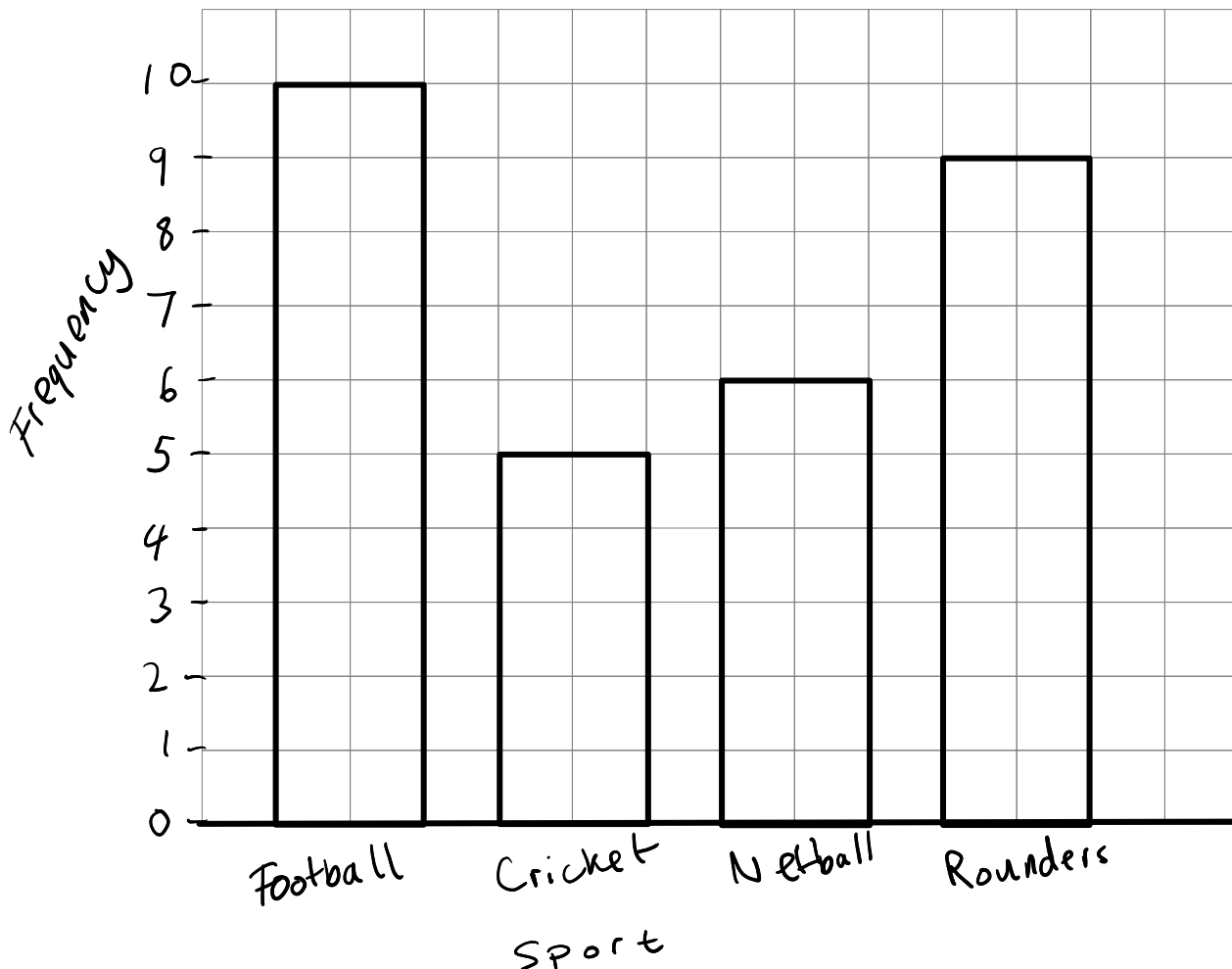
<del>Football</del>	<del>Cricket</del>	<del>Football</del>	<del>Netball</del>	<del>Rounders</del>
<del>Rounders</del>	<del>Football</del>	<del>Cricket</del>	<del>Netball</del>	<del>Netball</del>
<del>Netball</del>	<del>Rounders</del>	<del>Rounders</del>	<del>Football</del>	<del>Rounders</del>
<del>Cricket</del>	<del>Rounders</del>	<del>Football</del>	<del>Football</del>	<del>Cricket</del>
<del>Football</del>	<del>Rounders</del>	<del>Rounders</del>	<del>Netball</del>	<del>Football</del>
<del>Football</del>	<del>Football</del>	<del>Cricket</del>	<del>Rounders</del>	<del>Netball</del>

(a) Complete the frequency table.

Sport	Tally	Frequency
Football		10
Cricket		5
Netball		6
Rounders		9

(2)

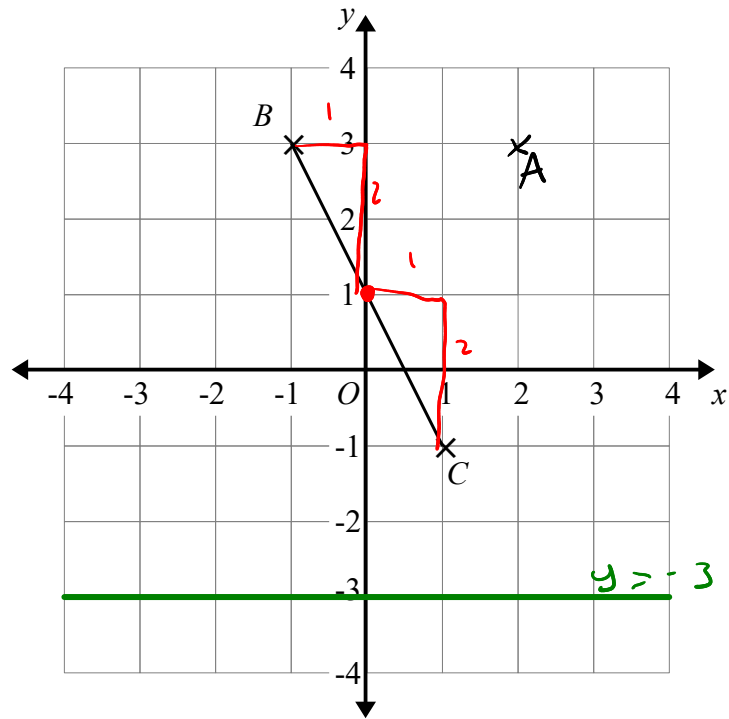
(b) Draw a bar chart to show the results.



(3)

(Total for Question 5 is 5 marks)

6



(a) Plot the point with coordinates (2, 3)  
Label this point *A*.

(1)

(b) Write down the coordinates of the midpoint of *BC*.

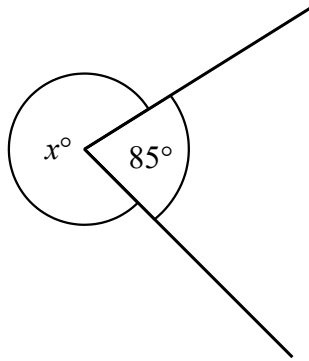
( 0 , 1 )  
(1)

(c) Draw the line with equation  $y = -3$

(1)

(Total for Question 6 is 3 marks)

7



$$\begin{array}{r} 275 \\ - 85 \\ \hline 275 \end{array}$$

(a) Find the value of  $x$ .

$$x = 275^\circ$$

(b) Give a reason for your answer.

(1)

Angles around a point add to  $360^\circ$

(1)

(Total for Question 7 is 2 marks)

8 A total of 1400 tickets were on sale for a show.

819 of the tickets were sold.

How many tickets were not sold.

$$\begin{array}{r} 1400 \\ - 819 \\ \hline 581 \end{array}$$

581

(Total for Question 8 is 2 marks)

9

$$A = 3b - 2c$$

(i) Work out the value of  $A$  when  $b = 6$  and  $c = 2$

$$\begin{aligned} A &= 3(6) - 2(2) \\ &= 18 - 4 \\ &= 14 \end{aligned}$$

$$A = \underline{\quad 14 \quad} \quad (2)$$

(ii) Work out the value of  $A$  when  $b = -3$  and  $c = 4$

$$\begin{aligned} A &= 3(-3) - 2(4) \\ &= -9 - 8 \end{aligned}$$

$$A = \underline{\quad -17 \quad} \quad (2)$$

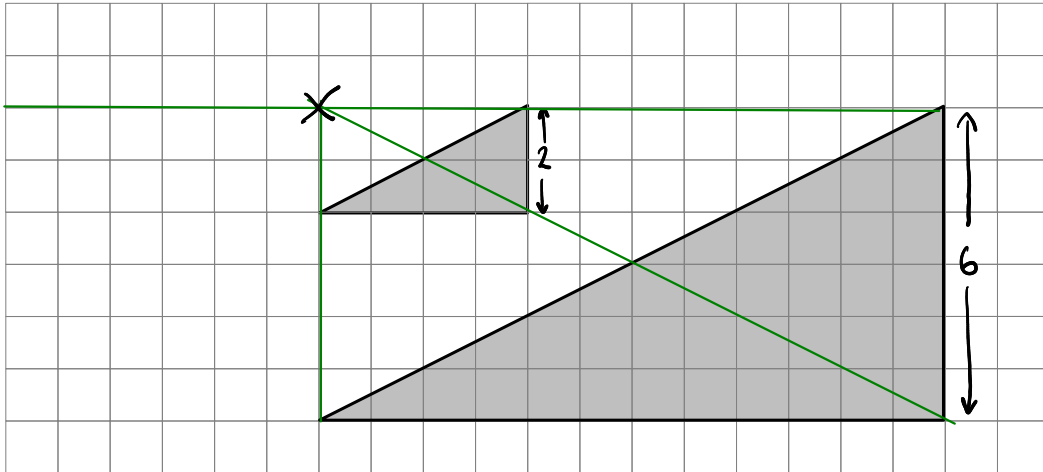
(iii) Work out the value of  $b$  when  $A = 11$  and  $c = 5$

$$\begin{aligned} 11 &= 3b - 2(5) \\ 11 &= 3b - 10 \\ 21 &= 3b \\ b &= 21 \div 3 \end{aligned}$$

$$b = \underline{\quad 7 \quad} \quad (2)$$

(Total for Question 9 is 6 marks)

10 Here are two triangles on a grid.



Triangle **B** is an enlargement of triangle **A**.

(a) (i) Write down the scale factor of the enlargement.

$$6 \div 2 = 3$$

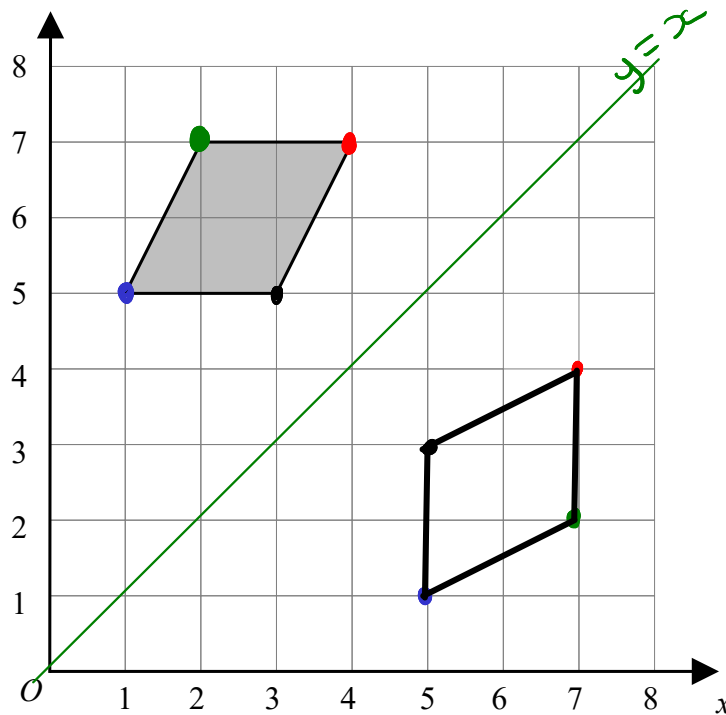
3

(ii) On the grid, mark with a cross (×) the centre of enlargement

(1)

(1)

Here is a parallelogram on a coordinate grid.



(b) On the grid reflect the parallelogram in the line  $y = x$

(2)

(Total for Question 10 is 4 marks)



11 There are 32 cubes in a bag.

10 of the cubes are red.

13 of the cubes are blue.

The rest of the cubes are green.

A cube is picked at random from the bag.

Write down the probability that

(i) the cube is green,

$$10 + 13 = 23$$

$$32 - 23 = 9$$

$$\frac{9}{32}$$

(1)

(ii) the cube is **not** red,

10 Red      22 Not Red

$$\frac{22}{32}$$

(1)

(iii) the cube is yellow

0 Yellow cubes

$$0$$

(1)

(Total for Question 12 is 3 marks)

12 In company A there are 98 full time workers and 70 part time workers.

In company B  $\frac{7}{12}$  of the workers are full time workers and the rest are part time workers.

Show that the ratio of full time workers to part time workers is the same for both companies.

Company A

$$98 : 70$$

$$49 : 35$$

$$\underline{\underline{7 : 5}}$$

Company B

$$\frac{7}{12} : \frac{5}{12}$$

$$\underline{\underline{7 : 5}}$$

both ratios  
are 7:5

(Total for Question 12 is 3 marks)

13 (a) Work out an estimate for the value of  $91 \times 1.73$

You must show all your working.

$$90 \times 2 = 180$$

180

(2)

Given that

$$3.14 \times 1.6 = 5.024$$

(b) find the value of  $314 \times 0.16$

$\times 100$   $\div 10$

$\times 100$  and  $\div 10$

$$5.024 \times 100 \div 10$$

50.24

(1)

(Total for Question 15 is 3 marks)

14 Here is the list of ingredients for making 20 muffins.

Ingredients for 20 muffins
400g Flour
250g Sugar
150g Butter

10 muffins  
200g  
125g  
75g

Gary wants to make 50 muffins.  
How much sugar does Gary need?

$$\begin{array}{r} 125 \\ \times 5 \\ \hline 625 \end{array}$$

..... 625 g

(Total for Question 14 is 2 marks)

15 Phil is buying a boat.  
The boat costs £18000

Phil pays 20% of the cost as a deposit.  
He pays the rest of the cost in 20 equal monthly payments.

How much is each monthly payment?

$$\frac{18000}{10} = 1800 \quad (10\%)$$

$$1800 \times 2 = 3600 \quad 20\%$$

$$\begin{array}{r} 18000 \\ - 3600 \\ \hline 14400 \end{array}$$

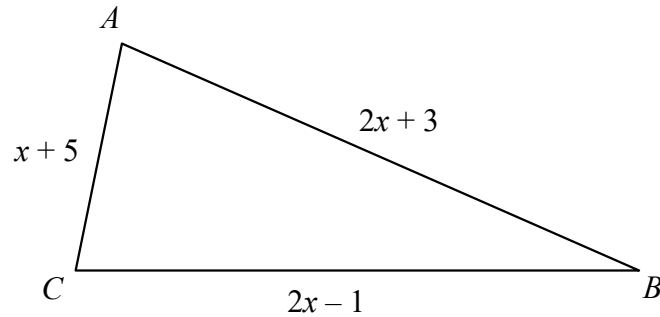
20  
40  
60  
80  
100  
120  
140

$$20 \overline{) 14400} \begin{array}{l} 00720 \\ \hline 14400 \end{array}$$

£ 720

(Total for Question 15 is 4 marks)

16 Here is a triangle  $ABC$ .



All the measurements are in centimetres.

The perimeter of  $ABC$  is 62 centimetres.

Work out the length of  $AB$ .

$$\begin{aligned}2x + 3 + x + 5 + 2x - 1 &= 62 \\5x + 7 &= 62 \\5x &= 55 \\x &= 11\end{aligned}$$

AB

$$\begin{aligned}2(11) + 3 \\22 + 3 \\25\end{aligned}$$

.....25.....centimetres

(Total for Question 16 is 4 marks)

17 95 people bought raffle tickets.

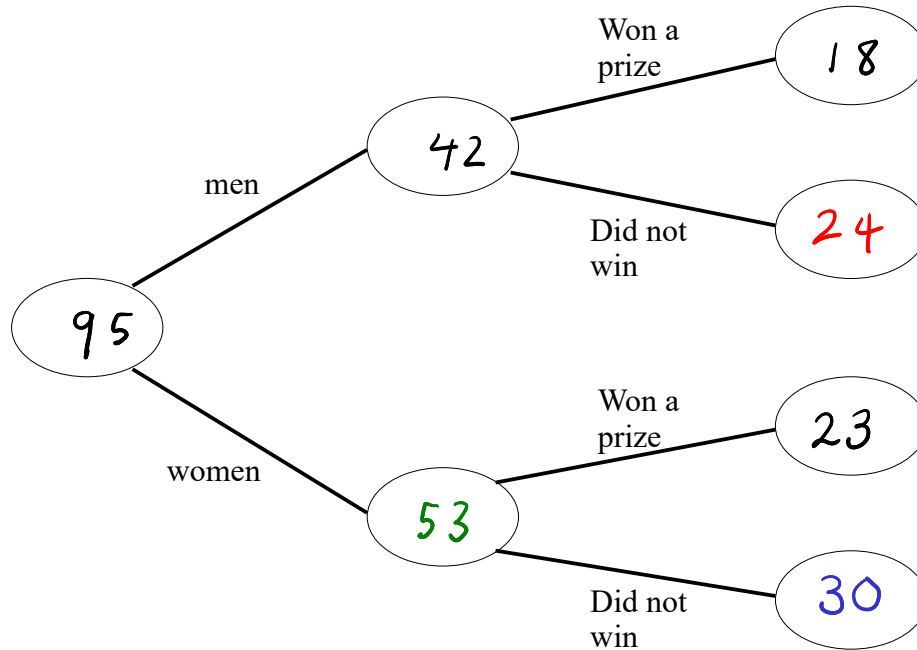
18 out of the 42 men who bought a raffle ticket won a prize.

23 of the women who bought a ticket won a prize.

Use this information to complete the frequency tree.

$$\begin{array}{r} 342 \\ - 18 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 95 \\ - 42 \\ \hline 53 \end{array}$$



(Total for Question 17 is 3 marks)

18 Increase 320 by 15%

$$\frac{320}{10} = 32 \quad (10\%)$$

$$32 \div 2 = 16 \quad (5\%)$$

$$\begin{aligned} 15\% \text{ of } 320 &= 32 + 16 \\ &= 48 \end{aligned}$$

$$\begin{array}{r} 320 \\ + 48 \\ \hline 368 \end{array}$$

368

(Total for Question 18 is 3 marks)

19 Work out  $5.92 \div 0.16$

$$\frac{5.92}{0.16} = \frac{592}{16}$$

$$16 \overline{) 592}$$

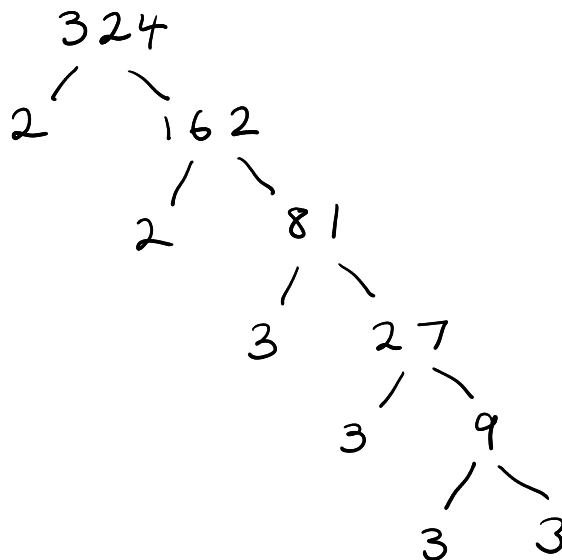
037

16  
32  
48  
64  
80  
96  
112

..... 37

(Total for Question 19 is 3 marks)

20 Write 324 as a product of powers of its prime factors.



.....  $2^2 \times 3^4$

(Total for Question 20 is 3 marks)

21 (a) Work out  $2\frac{2}{3} + 1\frac{3}{5}$

$$2\frac{2}{3} = \frac{8}{3}$$

$$1\frac{3}{5} = \frac{8}{5}$$

Give your answer as a mixed number.

$$5 \times \frac{8}{3} + \frac{8 \times 3}{5 \times 3}$$

$$\frac{40}{15} + \frac{24}{15} = \frac{64}{15} = 4\frac{4}{15}$$

$$\underline{4\frac{4}{15}}$$

(2)

(b) Work out  $\frac{2}{3} \div \frac{3}{4}$

$$\frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$$

$$\underline{\frac{8}{9}}$$

(2)

(Total for Question 21 is 4 marks)

22 Work out the value of  $\frac{5^{-3} \times 5^7}{5}$

$$-3 + 7 = 4$$

$$\frac{5^4}{5^1} = 5^3 = 125$$

$$\underline{125}$$

(Total for Question 22 is 2 marks)

23 Tracey writes down three numbers  $a$ ,  $b$  and  $c$ .

$$\begin{array}{l} a:b = 3:5 \\ a:c = 4:7 \end{array} \quad \begin{array}{l} \times 4 \\ \times 3 \end{array}$$

(a) Find  $a:b:c$

$$\begin{array}{l} a:b \\ 12:20 \end{array} \quad \begin{array}{l} a:c \\ 12:21 \end{array}$$

$$\underline{\underline{12:20:21}}$$

(2)

Jamie writes down three numbers  $d$ ,  $e$  and  $f$ .

$$\begin{array}{l} d = 2e \\ f = 3d \end{array}$$

(b) Find  $e:d:f$

$$\text{Let } e = 1$$

$$d = 2 \times 1 = 2$$

$$f = 3 \times d = 6$$

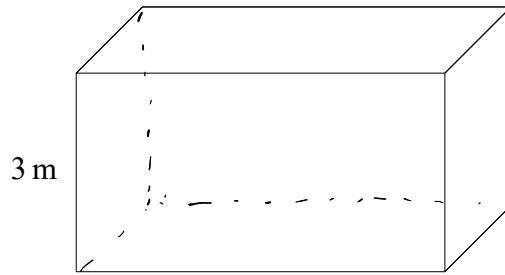
$$\underline{\underline{1:2:6}}$$

(2)

(Total for Question 23 is 4 marks)



24 The diagram shows a cuboid.



$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The cuboid has height 3 m

The volume of the cuboid is  $21 \text{ m}^3$

The pressure on the floor due to the cuboid is  $25 \text{ newtons/m}^2$  (pressure)

Work out the force exerted by the cuboid on the floor.

$$\begin{aligned} \text{Area of base} &= 21 \div 3 \\ &= 7 \text{ m}^2 \quad (\text{area}) \end{aligned}$$

$$25 = \frac{\text{Force}}{7}$$

$$\text{Force} = 25 \times 7$$

..... 175 ..... newtons

(Total for Question 24 is 3 marks)

25 In a bag there are counters.  
The counters are all either red or blue or yellow.

The number of red counters : The number of blue counters : The number of yellow counters = 4 : 5 : 8

The number of yellow counters is 24 more than the numbers of blue counters.

Work out the total number of counters in the bag.

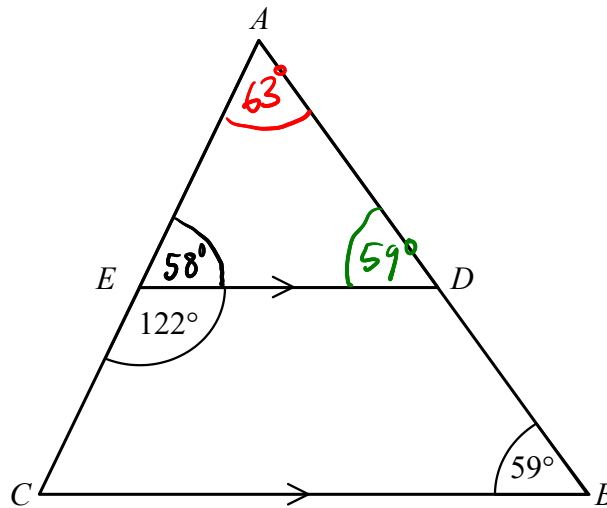
Red	8	8	8	8	32			
Blue	8	8	8	8	8	40		
Yellow	8	8	8	8	8	8	8	64

$$24 \div 3 = 8 \quad \rightarrow 24$$

$$\begin{array}{r} 32 \\ 40 \\ 64 \\ \hline 136 \\ \hline 136 \end{array}$$

(Total for Question 25 is 3 marks)

26  $ABC$  is a triangle.



$AEC$  and  $ADB$  are straight lines.

$ED$  is parallel to  $CB$ .

Angle  $CED = 122^\circ$

Angle  $ABC = 59^\circ$

Work out the size of angle  $CAB$ .

You must give a reason for each stage of your working.

$AED = 58^\circ$  Angles on a straight line add to  $180^\circ$

$ADE = 59^\circ$  Corresponding angles are equal

$$180 - (59 + 58) = \underline{\underline{63^\circ}}$$
$$180 - 117$$

Angles in a triangle add to  $180^\circ$

(Total for Question 26 is 5 marks)

27  $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$   $\mathbf{b} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

Work out  $3\mathbf{a} + \mathbf{b}$  as a column vector.

$$3\mathbf{a} = 3 \begin{pmatrix} 3 \\ 2 \end{pmatrix}$$
$$= \begin{pmatrix} 9 \\ 6 \end{pmatrix}$$

$$\begin{pmatrix} 9 \\ 6 \end{pmatrix} + \begin{pmatrix} -1 \\ 5 \end{pmatrix} = \begin{pmatrix} 8 \\ 11 \end{pmatrix}$$

$$\begin{pmatrix} 8 \\ \dots\dots \\ 11 \\ \dots\dots \end{pmatrix}$$

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(Total for Question 27 is 2 marks)

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**TOTAL FOR PAPER IS 80 MARKS**