

GCSE Mathematics

Practice Tests: Set 9

Paper 1F (Non-calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

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 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.

Answer ALL questions.

Write your answers in the spaces provided.

Converting FDP

You must write down all the stages in your working.

1 Write $\frac{4}{5}$ as a decimal.

$$\begin{array}{l} \times 2 \\ \hline \frac{4}{5} = \frac{8}{10} = 8 \text{ tenths} \\ \hline \times 2 \\ \hline = \underline{\underline{0.8}} \end{array}$$

0.8

(Total for Question 1 is 1 mark)

2 Write $\frac{35}{45}$ as a fraction in its simplest form.

$$\begin{array}{l} \div 5 \\ \hline \frac{35}{45} = \frac{7}{9} \\ \hline \div 5 \end{array}$$

Equivalent Fractions

$\frac{7}{9}$

(Total for Question 2 is 1 mark)

3 Write these decimals in order of size.

4.81 4.013 4.85 4.807 4.02

Ordering Decimals

Start with the smallest decimal.

4.810 (4)
4.013 (1)
4.850 (5)
4.807 (3)
4.020 (2)

4.013, 4.02, 4.807, 4.81, 4.85

(Total for Question 3 is 1 mark)

4 Find the sum of $\frac{13}{20}$ and 0.72.

Converting FDP

Give your answer as a decimal.

$$\begin{array}{l} (\div 2) \quad \left| \quad \frac{1}{10} = 0.1 \right. \\ \quad \quad \quad \left| \quad \frac{1}{20} = 0.05 \right. \\ (\times 13) \quad \left| \quad \frac{13}{20} = 0.65 \right. \\ \hline \text{Add} \quad \quad \left| \quad \begin{array}{r} 0.65 + \\ 0.72 \\ \hline 1.37 \\ \hline \end{array} \right. \end{array}$$

1.37

(Total for Question 4 is 2 marks)

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2

5 The table gives information about the weights, in kilograms, of five animals.

Animal	Weight in kilograms
African buffalo	725
Indian elephant	3178
Giraffe	800
Pilot whale	2205
Walrus	1013

(a) Which animal has the least weight?

Interpreting Tables

American Buffalo
.....
(1)

(b) Write down the value of the 1 in the number 3178.

Place value

100
.....
(1)

(c) Work out the difference between 2205 and 1013.

Subtraction

= minus

$$\begin{array}{r} 2205 \\ - 1013 \\ \hline 1192 \end{array}$$

$$\begin{array}{r} 2205 \\ - 1013 \\ \hline 1192 \end{array}$$

.....
(1)

The weight of a blue whale is 20 times the weight of the giraffe.

(d) Work out the weight of the blue whale.

Converting Units

Give your answer in tonnes.

1 tonne = 1000 kg

Giraffe = 800 kg

Giraffe (x20) = whale

whale = 20 x 800 kg

whale = 16000 kg

..... 16 tonnes

(2)

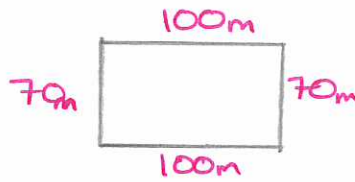
1 tonne = 1000 kg
(convert by ÷ 1000)

whale = 16 tonnes

(Total for Question 5 is 5 marks)

Perimeter of 2D shapes

- 6 A field is in the shape of a rectangle.
The width of the field is 70 m.
The length of the field is 100 m.
Fafa walks around the edge of the field 3 times.
Work out the total distance Fafa walks.



Perimeter

$$P = 70\text{m} + 70\text{m} + 100\text{m} + 100\text{m} = 340\text{m}$$

Walks round 3 times

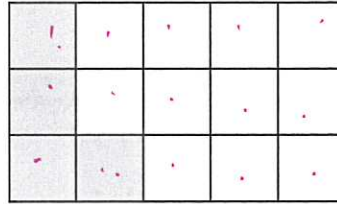
$$3P = 340\text{m} \times 3$$
$$= \underline{\underline{1020\text{m}}}$$
$$\begin{array}{r} 340 \\ 3 \times \\ \hline 1020 \\ \hline \end{array}$$

..... 1020 m

(Total for Question 6 is 3 marks)

Proportion

7 Here is a rectangle A made from centimetre squares.



rectangle A

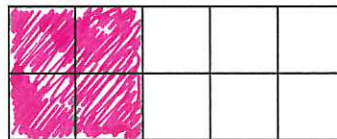
(a) What fraction of rectangle A is shaded?

"4 out of 15" = $\frac{4}{15}$

$\frac{4}{15}$

(1)

Rectangle B is made from centimetre squares.



rectangle B

(b) Shade 40% of rectangle B.

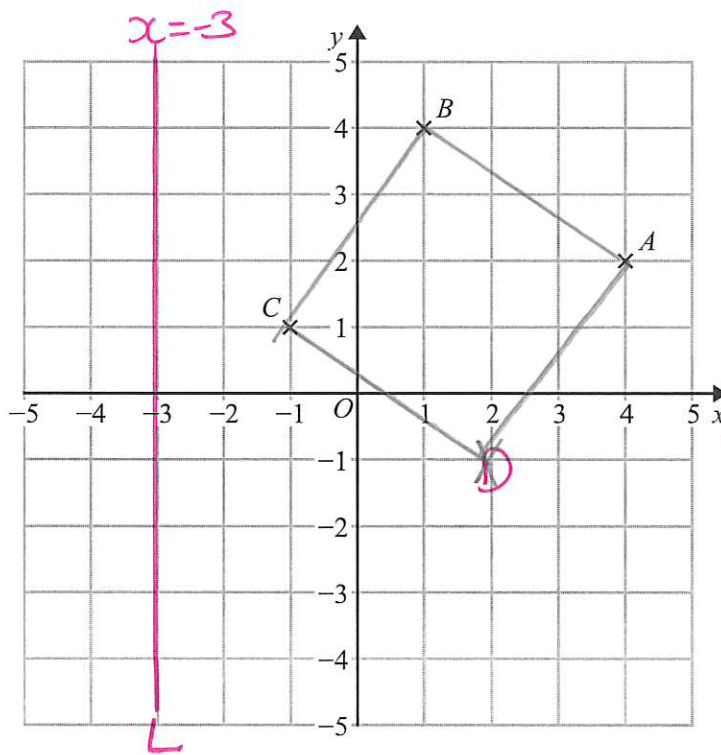
$\frac{40}{100} = \frac{4}{10}$

(1)

(Total for Question 7 is 2 marks)

Plotting straight lines

8 A, B and C are three points marked on a grid.



- (a) On the grid, draw the line with equation $x = -3$.
Label the line L .

(1)

M is the midpoint of AB . (x, y)

- (b) Find the coordinates of M .

midpoint of Coordinates

$$A = (4, 2) \quad , \quad B = (1, 4)$$

$$\text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{4+1}{2}, \frac{2+4}{2} \right) = \left(\frac{5}{2}, 3 \right)$$

(2)

D is the point so that $ABCD$ is a square.

- (c) Find the coordinates of D .

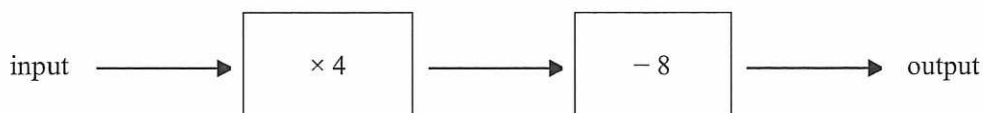
D is same distance from C as
A is from B \therefore 3 right 2 down!

(2 , -1)
(2)

(Total for Question 8 is 5 marks)

Function Machines

9 Here is a number machine.



(a) Work out the output when the input is 18.

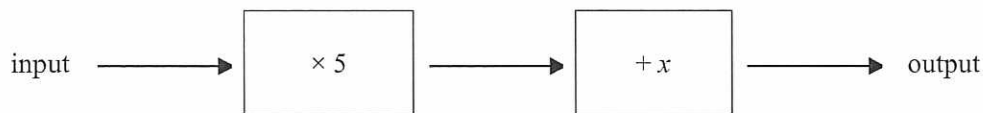
$$\begin{array}{r} 18 \\ \times 4 \\ \hline 72 \\ 3 \end{array}$$

$$18 \longrightarrow \times 4 = 72 \longrightarrow - 8 = \underline{\underline{64}} \dots\dots\dots (1)$$

(b) Work out the input when the output is 20.

$$\begin{array}{r} \div 4 \longleftarrow + 8 \longleftarrow 20 \\ \hline = \underline{\underline{7}} \qquad = 28 \qquad \dots\dots\dots 7 \end{array} \quad \text{opposite!} \quad (2)$$

Here is a different number machine.



For this number machine, when the input is 8 the output is 50

(c) Work out the value of x.

$$\begin{array}{l|l} \text{Machine} & 8 \times 5 + x = 50 \\ & 40 + x = 50 \\ & x = \underline{\underline{10}} \\ & x = \dots\dots\dots 10 \end{array} \quad \text{(-40)} \quad (2)$$

(Total for Question 9 is 5 marks)

Bar and Tally Charts

10 Here is a list of all the nut trees Caterina counted one day.

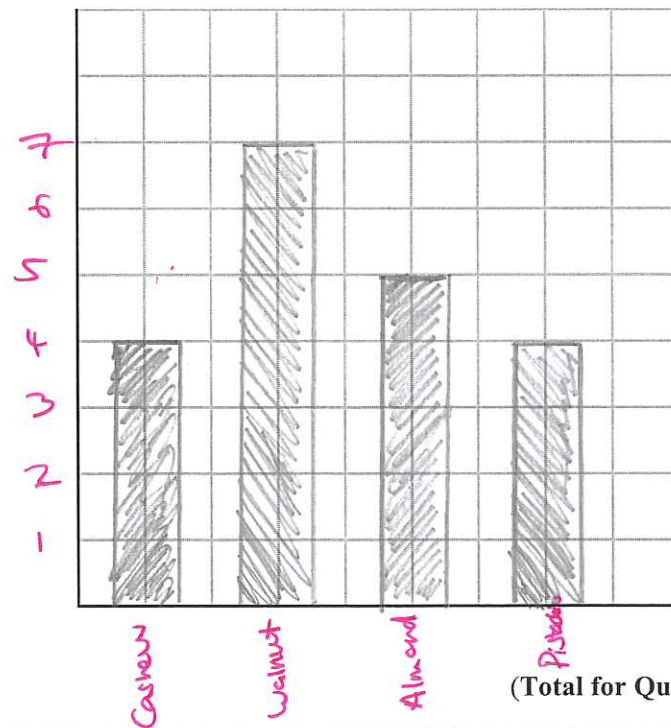
cashew	pistachio	almond	cashew	almond
walnut	walnut	almond	pistachio	cashew
cashew	walnut	almond	walnut	pistachio
almond	walnut	pistachio	walnut	walnut

(a) Complete the frequency table for Caterina's list.

Nut tree	Tally	Frequency
cashew		4
walnut		7
almond		5
pistachio		4

(2)

(b) Draw a bar chart for the information in your table.



(3)

(Total for Question 10 is 5 marks)

Simplifying Algebraic Expressions

11 (a) Simplify $y \times y \times y$

$$\underline{\underline{y^3}} \quad (1)$$

(b) Simplify $3c \times 2d$
 $= 3 \times c \times 2 \times d$
 $= 6 \times c \times d$
 $= \underline{\underline{6cd}}$

$$\underline{\underline{6cd}} \quad (1)$$

(c) Simplify $2k - 4k + 3k$

$$2 \text{ lots } - 4 \text{ lots } + 3 \text{ lots } = 1 \text{ lot } = 1k = \underline{\underline{k}}$$

$$\underline{\underline{k}} \quad (1)$$

(Total for Question 11 is 3 marks)

Negative Numbers

12 The table shows the temperatures at midnight and at midday at five ski resorts.

Ski resort	Temperature at midnight (°C)	Temperature at midday (°C)
Chamonix	-5	3
Alto Campoo	-8	-2
Javornik	-5	-4
La Parva	-2	-2
Asiago	-7	0

(a) Which ski resort had the lowest temperature at midnight?

Alto Campoo (1)

(b) Work out the increase in temperature from midnight to midday for Chamonix.

difference!
 $3 - (-5) = 8$
 midday midnight 8 °C (1)

Jan knows that the temperature falls by 1 °C for every 300 m increase in height above Asiago.

(c) What was the temperature at midnight at a height 1800 m above Asiago?

$1800\text{m} \div 300\text{m} = 6$ sets of temperature fall
 $6 \times 1^\circ\text{C} = 6^\circ\text{C}$ fall
 $-7 - 6 = -13^\circ\text{C}$ -13 °C (2)

(Total for Question 12 is 4 marks)

Single Event Probability

- 13 There are 20 counters in bag X.
7 of the counters are green.
10 of the counters are red.
The rest of the counters are blue.

Ruth takes at random a counter from bag X.

- (a) Write down the probability that the counter is red.

$$P(\text{red}) = \text{"10 out of 20"} = \frac{10}{20} = \frac{1}{2} \dots\dots\dots \frac{1}{2} \quad (1)$$

- (b) Work out the probability that the counter is blue.

$$P(\text{blue}) = 1 - \frac{7}{20} - \frac{10}{20} = \frac{3}{20} \dots\dots\dots \frac{3}{20} \quad (1)$$

Sum of all probabilities ↑ ↑ ↑
 P(green) P(red)

Ruth puts the counter back into bag X.

Bag Y only contains green counters, red counters and blue counters.

In bag Y there are,

- 2 more green counters than in bag X
- 1 more red counter than in bag X
- 2 more blue counters than in bag X

Adam takes at random a counter from bag Y.

Ruth takes at random a counter from bag X.

- (c) Who has the greater probability of taking a green counter, Adam or Ruth?
Show your working clearly.

$$P(\text{Green}) \text{ for Ruth} = \frac{7}{20} = 0.35$$

$$P(\text{Green}) \text{ for Adam: His bag has: } \begin{array}{l} 9 \text{ green} \\ 11 \text{ red} \\ 5 \text{ blue} \end{array} \quad \begin{array}{l} 25 \text{ total} \\ = \frac{9}{25} = 0.36 \end{array}$$

∴ Adam has the greater probability for green. $0.36 > 0.35$.

(3)

(Total for Question 13 is 5 marks)

Angles in Straight Lines (Forming and Solving Equations)

14

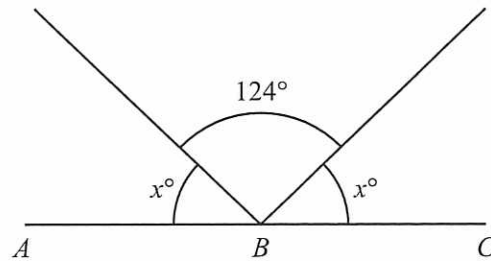


Diagram **NOT** accurately drawn

ABC is a straight line.
Work out the value of x .

$$\begin{aligned}
 x + x + 124^\circ &= 180^\circ \\
 2x + 124^\circ &= 180^\circ \\
 2x &= 56^\circ \\
 \underline{x} &= \underline{28^\circ}
 \end{aligned}$$

Angles in straight line = 180°
collect
(-124°)
($\div 2$)

$$\begin{array}{r}
 28 \\
 2 \overline{)56} \\
 \underline{4} \\
 16 \\
 \underline{16} \\
 0
 \end{array}$$

$x = 28^\circ$

(Total for Question 14 is 3 marks)

15 Show that $\frac{7}{8} - \frac{1}{6} = \frac{17}{24}$

Fraction Operations

LCM of 8 and 6 = 24
 8 16 24
 6 12 18 24

$$\begin{array}{l}
 \frac{7}{8} \xrightarrow{\times 3} \frac{21}{24} \\
 \frac{1}{6} \xrightarrow{\times 4} \frac{4}{24}
 \end{array}$$

$$\frac{7}{8} - \frac{1}{6}$$

$$= \frac{21}{24} - \frac{4}{24} = \frac{17}{24} \quad \square$$

(Total for Question 15 is 2 marks)

Substitution

16 $y = c - dx$

$$c = 15$$

$$d = 8$$

$$x = -4$$

(a) Work out the value of y .

Substitute

$$\begin{aligned} y &= c - dx \\ y &= (15) - (8)(-4) \\ y &= 15 - -32 \\ y &= 47 \end{aligned}$$

$$y = \underline{47} \dots\dots\dots (2)$$

$$t = 4(p - q)$$

$$t = 18$$

$$q = 6$$

(b) Work out the value of p .

Substitute

Expand

$(+24)$

$(\div 4)$

$$\begin{aligned} t &= 4(p - q) \\ 18 &= 4(p - 6) \\ 18 &= 4p - 24 \\ 42 &= 4p \\ \frac{42}{4} &= p = 10.5 \end{aligned}$$

$$p = \underline{10.5} \dots\dots\dots (2)$$

(Total for Question 16 is 4 marks)

Area of 2D Shapes

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here is a hexagon $ABCDEF$.

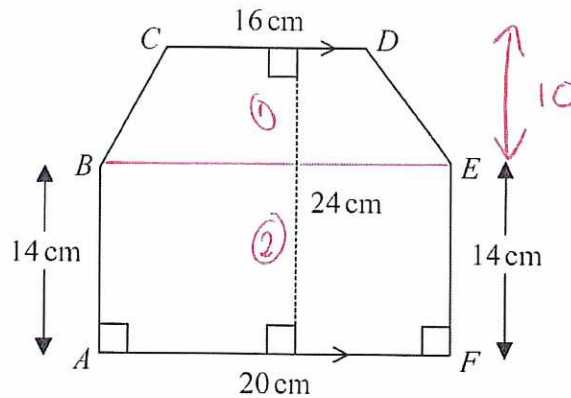


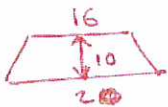
Diagram NOT accurately drawn

CD is parallel to AF .

Work out the area of hexagon $ABCDEF$.

① Area of trapezium

$$A = \frac{h(a+b)}{2}$$



$$A = \frac{10(16+20)}{2} = \frac{10(36)}{2} = 180 \text{ cm}^2$$

② Area of rectangle

$$A = L \times W$$

$$A = 20 \times 14 = 280 \text{ cm}^2$$

Total Area

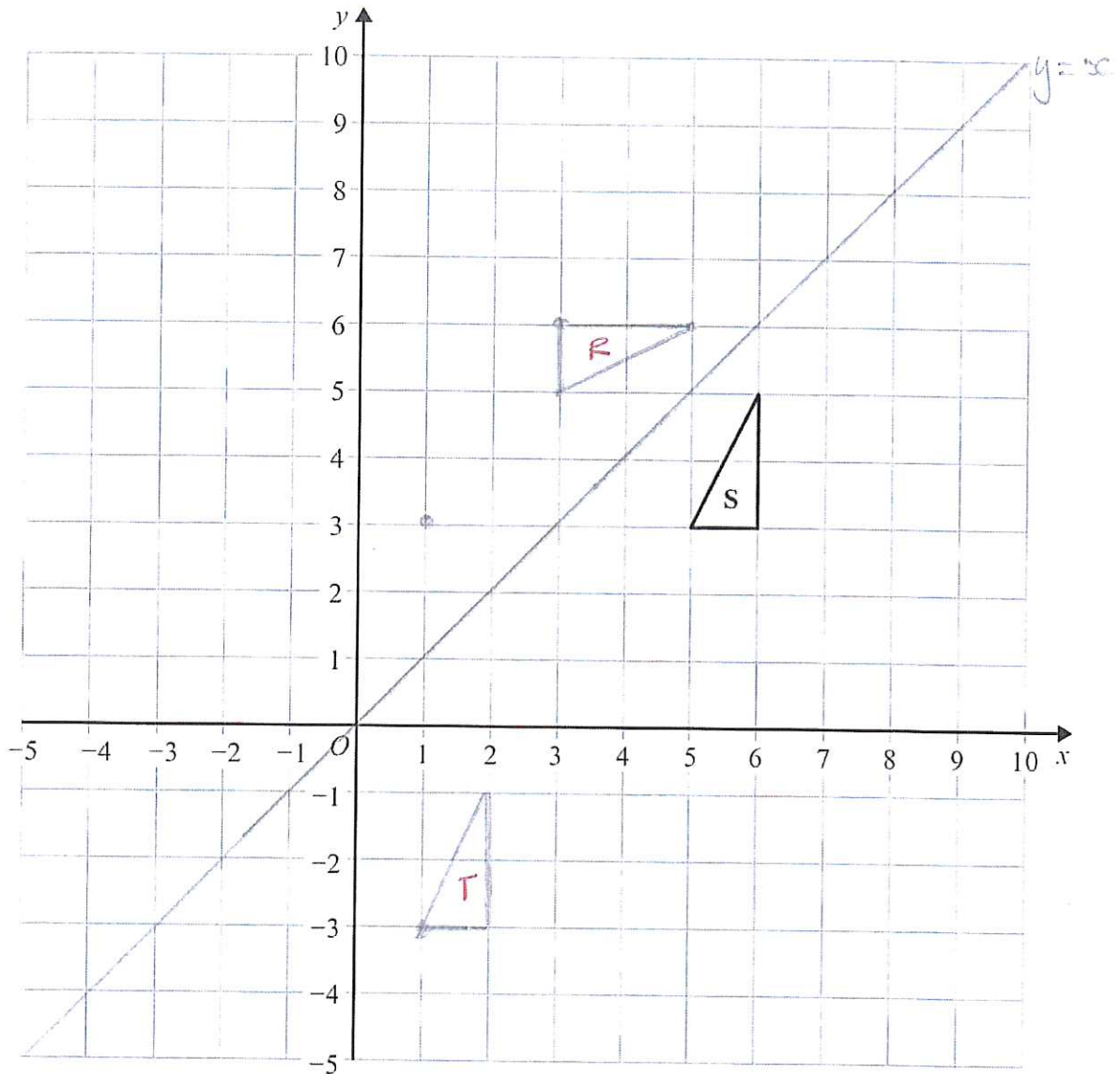
$$\begin{aligned} \text{①} + \text{②} &= 180 \text{ cm}^2 + 280 \text{ cm}^2 \\ &= \underline{\underline{460 \text{ cm}^2}} \end{aligned}$$

..... 460 cm²

(Total for Question 1 is 4 marks)

Transformations

2



- (a) *← Flip*
 Reflect triangle S in the line $y = x$
 Label the new triangle R.

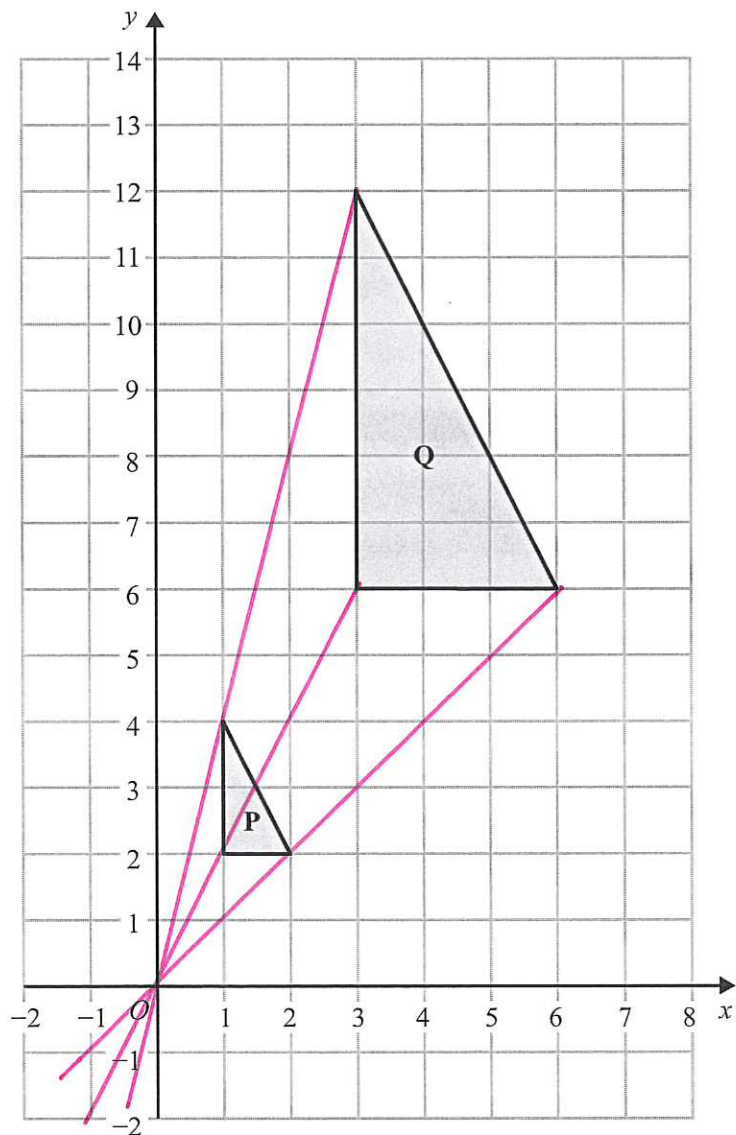
(2)

- (b) *← slides*
 Translate triangle S by the vector $\begin{pmatrix} -4 \\ -6 \end{pmatrix}$
 Label the new triangle T.

(1)

(Total for Question 2 is 3 marks)

Transformations



(c) Describe fully the single transformation that maps triangle P onto triangle Q.

Enlargement Scale factor 3 centre (0,0)

(2)

(Total for Question 18 is 5 marks)

Expanding and Simplifying

19 (a) Expand and simplify $3(c-7) + 2(3c+4)$

$$\begin{array}{l|l} \text{Expand} & 3c - 21 + 6c + 8 \\ \text{Collect} & \underline{9c - 13} \end{array} \qquad \begin{array}{l} 9c - 13 \\ \hline \end{array} \qquad (2)$$

(b) Expand and simplify $(x+7)(x-2)$

Expanding Double Brackets

$$\begin{array}{l|l} \text{Expand} & x^2 - 2x + 7x - 14 \\ \text{Collect} & \underline{x^2 + 5x - 14} \end{array} \qquad \begin{array}{l} x^2 + 5x - 14 \\ \hline \end{array} \qquad (2)$$

(c) Factorise fully $28y^2 - 21y$

$$\begin{array}{l|l} 7 \text{ is a factor} & 7(4y^2 - 3y) \\ y \text{ is a factor} & \underline{7y(4y - 3)} \end{array} \qquad \begin{array}{l} 7y(4y - 3) \\ \hline \end{array} \qquad (2)$$

(Total for Question 19 is 6 marks)

Prime Numbers

20 $E = n^2 + n + 5$

(a) Work out the value of E when $n = 3$

$$E = (3)^2 + (3) + 5$$

$$E = 9 + 3 + 5$$

$$E = \underline{17}$$

Substitution

$$E = \underline{17} \dots\dots\dots (1)$$

Ali thinks that the value of E will be a prime number for any whole number value of n .

(b) Is Ali correct?

You must give a reason for your answer.

Prime Numbers

No e.g: if $n = 10$: $E = (10)^2 + (10) + 5$

$$\therefore E = 100 + 10 + 5$$

$$E = 115. \underline{115 \text{ is not prime}} (2)$$

(Total for Question 20 is 3 marks)

Angles on Parallel Lines

4

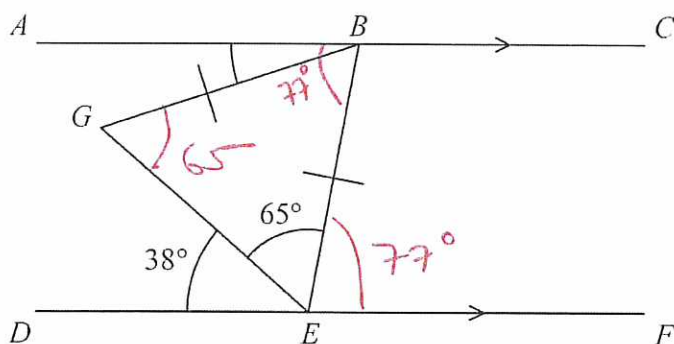


Diagram **NOT** accurately drawn

ABC and DEF are parallel lines.

$BG = BE$

Angle $DEG = 38^\circ$

Angle $GEB = 65^\circ$

Find the size of angle ABG .

$$\begin{aligned} \hat{B}EF &= 180^\circ - 65^\circ - 38^\circ \\ &= 77^\circ \end{aligned}$$

$$\hat{B}EF = \hat{A}BE = 77^\circ$$

$$\hat{B}GE = 65^\circ$$

$$\begin{aligned} \hat{G}BE &= 180^\circ - 65^\circ - 65^\circ \\ &= 50^\circ \end{aligned}$$

$$\begin{aligned} \hat{A}BG &= \hat{A}BE - \hat{G}BE \\ &= 77^\circ - 50^\circ \\ &= \underline{\underline{27^\circ}} \end{aligned}$$

Angles on straight line = 180°

Alternate angles equal

Isosceles triangle

180° in a triangle

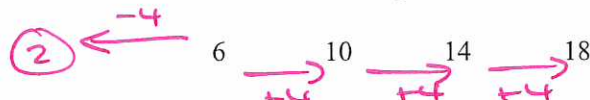
$$\begin{array}{r} 180 \\ - 65 \\ - 38 \\ \hline 77 \end{array}$$

27^o

(Total for Question 4 is 3 marks)

Linear Sequences

22 Here are the first four terms of an arithmetic sequence.



(a) Find an expression, in terms of n , for the n th term of this sequence.

$$= \underline{\underline{4n+2}}$$

$$\underline{\underline{4n+2}}$$

(2)

(b) Write down an expression, in terms of n , for the $(n+1)$ th term of this sequence.

$$\text{let } n = n+1$$

$$\begin{aligned} \therefore 4n+2 \text{ becomes } & \dots 4(n+1)+2 \\ & = 4n+4+2 \\ & = \underline{\underline{4n+6}} \end{aligned}$$

(1)

(Total for Question 22 is 3 marks)

23 (a) Write 1 390 000 in standard form.

Standard Form

$$\begin{array}{c} 1390000 \\ \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \\ 6 \text{ places} \end{array} \cdot 39$$

$$= 1.39 \times 10^6$$

(1)

(b) Write 0.005 in standard form.

$$\begin{array}{c} 0.005 \\ \uparrow \uparrow \uparrow \\ 3 \text{ places} \end{array}$$

$$= 5 \times 10^{-3}$$

(1)

(Total for Question 23 is 2 marks)

Simultaneous Equations

8 Solve

$$\begin{aligned} 3x + 2y &= 15 & \textcircled{1} \\ 10x - 4y &= 2 & \textcircled{2} \end{aligned}$$

Show clear algebraic working.

<p>$\textcircled{1} \times 2 :$</p> <p>$(\div 16)$</p> <p>In $\textcircled{1} :$</p> <p>(-6)</p> <p>$(\div 2)$</p>		$\begin{aligned} 6x + 4y &= 30 & \textcircled{3} \\ 10x - 4y &= 2 & \textcircled{2} \end{aligned}$ <p style="text-align: right; margin-right: 20px;">$\textcircled{+}$</p> <hr style="width: 50%; margin-left: 0;"/> $\begin{aligned} 16x &= 32 \\ x &= 2 \end{aligned}$ $\begin{aligned} 3x + 2y &= 15 \\ 3(2) + 2y &= 15 \\ 6 + 2y &= 15 \\ 2y &= 9 & x = \dots\dots\dots \frac{2}{\dots\dots\dots} \\ y &= \frac{9}{2} & y = \dots\dots\dots \frac{9}{2} \end{aligned}$	<p>Same Term Opposite Plus</p>
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(Total for Question 8 is 3 marks)