Write your name here

Surname	Other names

Edexcel GCSE

Mathematics B

Unit 2: Number, Algebra, Geometry 1 (non-calculator)

Higher Tier

Practice paper

Time: 1 hour 15 minutes **5MB2/2H**

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

Total marks

SOLUTIONS

Instructions

- Use black ink or ballpoint pen.
- Answer all the questions.
- Calculators must not be used.

Information

- The total mark for this paper is 60.
- The marks for each question are shown in brackets.
- Questions labelled with an asterisk (*) are those where the quality of your written communication will be assessed.

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.
You must write down all stages in your working.
Calculator not permitted.

1. Here are the ingredients needed to make ten Chocolate Chip Cookies.

Chocolate Chip Cookies
Makes 10 cookies
60 g of sugar
50 g of margarine
100 g of flour
40 g of chocolate chips
2 eggs

Liz makes some Chocolate Chip Cookies.

She uses 5 eggs.

a How many Chocolate Chip Cookies does Liz make?

5 eggs → 2 ½ × the recipe.

2 ½ × 10 cookies = 25 cookies.

25 ..... (2)

Delia has:

300 g of sugar
200 g of margarine
1 kg of flour
200 g of chocolate chips
and 12 eggs.

b Work out the greatest number of Chocolate Chip Cookies Delia can make.

Sugar : $\frac{300}{60} = 5$, can make 5× the recipe

Margarine, $\frac{200}{50} = 4$, " " (4×) " "

Flour, $\frac{10000g}{1000g} = 10$, " " 10× " "

Choc. chips, $\frac{200}{40} = 5$

Eggs, $\frac{12}{2} = 6$

4× the recipe,

40 cookies ..... (2)

(Total for Question 1 = 4 marks)

*2.

Cinema tickets
Evening: £5.80
Matinees: £4.00
15% discount for 'Friends of the Cinema'

Become a 'Friend of the Cinema'
Membership lasts for 1 year
Two people: £22

Mr Ross and his wife are thinking about becoming 'Friends of the Cinema'.

'Friends of the Cinema' receive a 15% discount on the cost of tickets.

Mr Ross and his wife estimate that, in one year, they will each go to 10 evening shows and 5 matinees.

Work out if the total cost of going to the cinema for one year will be cheaper for Mr Ross and his wife if they become 'Friends of the Cinema'.

Not "Friends"

$10 \times 2 \times 5.80 = £116$ evening shows

$5 \times 2 \times 4 = £40$ matinees

$£156$ total.

If "friends"

15% of $£156 = 156 \times 0.15 = 15.6 + 7.8 = £23.40$

Cost of membership £22, so they save £1.40 by becoming 'Friends of the Cinema'.

..... (5)

(Total for Question 2 = 5 marks)

3. Here are the first five terms of an arithmetic sequence:

–2 1 4 7 10

a Find an expression, in terms of n, for the nth term of this sequence.

Goes up in steps of 3, so $3n$ + something.

First term = -2 when $n=1$, so:

$3n-5$ ..... (2)

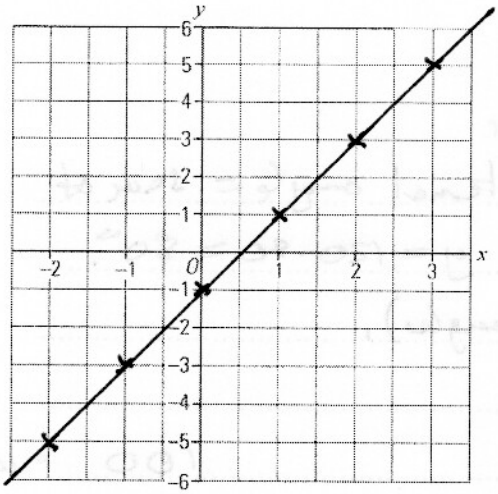
The nth term of a different number sequence is $2n^2 + 3$

b Find the 10th term of this sequence.

$2 \times 10^2 + 3 = 2 \times 100 + 3 = 203$ ..... (2)

(Total for Question 3 = 4 marks)

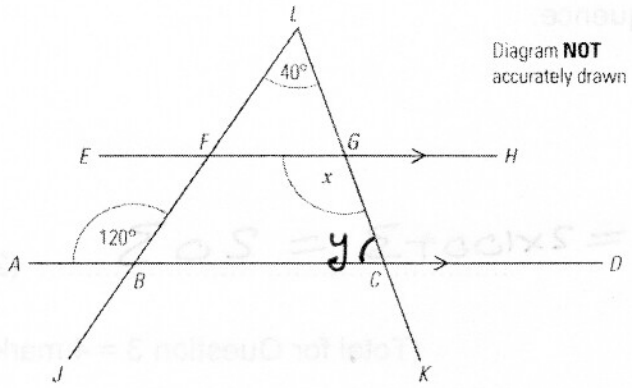
4. On the grid, draw the graph of $y = 2x - 1$ for values of x from -2 to 3. (3)



x	y
-2	-5
-1	-3
0	-1
1	1
2	3
3	5

(Total for Question 4 = 3 marks)

*5.



The lines *ABCD* and *EFGH* are parallel.

JBFL and *KCGL* are straight lines.

Work out the size of the angle marked *x*.

Explain clearly the reasons for your answer.

$y + 40 = 120$ (triangle external angle = sum of opposite internal angles) so $y = 120 - 40 = 80°$.

$x + y = 180$ (supplementary angles),

$x = 180 - y = 100°$

100 ° (4)

(Total for Question 5 = 4 marks)

6. Rob and Sam share £60 in the ratio 3 : 7

Sam gives some of his money to Rob.

The ratio of Rob's money to Sam's money is now 1 : 2

How much money did Sam give to Rob?

Sharing 3:7, 10 parts, 1 part = £6,

Rob £18 : Sam £42.

Sharing 1:2, 3 parts, 1 part = £20,

Rob £20 : Sam £40 £ 2 (4)

Sam had given Rob £2.

(Total for Question 6 = 4 marks)

7. **a** Expand and simplify $2(2x + 5) + 3(x - 2)$

$= 4x + 10 + 3x - 6$

$= 7x + 4$

..... (2)

b Simplify

i $m^2 \times m^5$

m^7

..... (1)

ii $t^7 \div t^3$

t^4

..... (1)

c Factorise completely $6x2y - 9xy$

Assume $6x^2y - 9xy$

$= 3(2x^2y - 3xy)$

$= 3xy(2x - 1)$

..... (2)

d Simplify $\frac{(x-4)^2}{x-4}$

$x - 4$

..... (1)

(Total for Question 7 = 7 marks)

8.

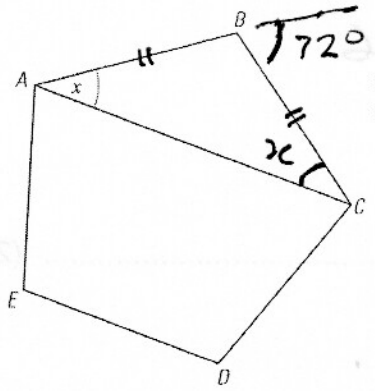


Diagram **NOT** accurately drawn

ABCDE is a regular pentagon.

AC is a straight line.

Work out the size of the angle marked x.

External angle $= \frac{360^\circ}{5} = 72^\circ$

Triangle ABC is isosceles.

$x + x = 72$ (external angle = sum of opposite internal angles)

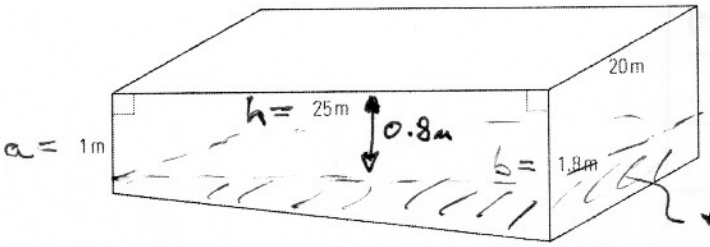
$\therefore x = \frac{72}{2} = 36^\circ$

36 ° (3)

(Total for Question 8 = 3 marks)

9. The diagram shows a swimming pool in the shape of a prism.

The cross-section of the prism is a trapezium.



fills this in 6 hours

The swimming pool is empty.

A tap is turned on and water flows into the swimming pool at a constant rate.

After 6 hours the water level is 80 cm below the top of the pool.

Water continues to flow into the pool at the same rate.

Work out how much longer it takes to completely fill the pool.

Cross-sectional area $\frac{(a+b)}{2}h = \frac{(1+1.8)}{2} \times 25$

$= \frac{2.8}{2} \times 25 = 1.4 \times 25 = 35 m^2$

Volume = cross-section area × length $= 35 \times 20 = 700 m^3$ (when full).

Volume of the top 80cm (0.8m) is

$25 \times 20 \times 0.8 = 400 m^3$

In 6 hours it has filled $700 - 400 = 300 m^3$,

flow rate $300/6 = 50 m^3$/hours.

To fill the remaining $400 m^3$ it will take

$400 m^3 / 50 m^3/h = 8$ hours.

8 hours (5)

(Total for Question 9 = 5 marks)

10. The average distance from the Earth to the Sun is 150 million ~~miles~~ km.

a Write 150 million in standard form.

1.5×10^8 (1)

The table gives the distance, in kilometres, of each of five stars from the Earth.

Star	Distance (km)
Aldebaran	5.7×10^{14}
Becrux	4.4×10^{15}
Castor	4.6×10^{14}
Hadar	3.0×10^{15}
Sirius	8.1×10^{13}

b Write these distances in order of size, smallest first.

8.1×10^{13}

4.6×10^{14}

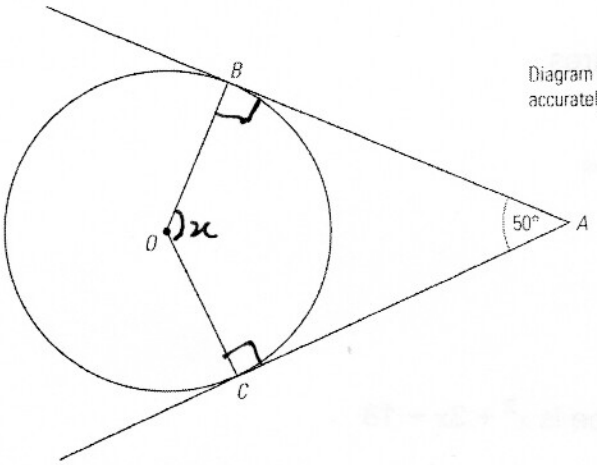
5.7×10^{14}

3.0×10^{15}

4.4×10^{15} (1)

(Total for Question 10 = 2 marks)

11.



B and *C* are points on the circumference of a circle, centre *O*.

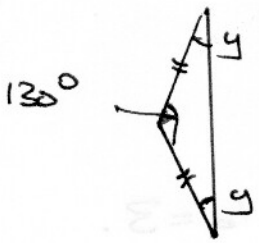
AB and *AC* are tangents to the circle.

Angle *BAC* = 50°

Find the size of angle *OBC*.

Angles in a quadrilateral add to 360°

$x + 50 + 90 + 90 = 360, \quad x = 130°$



Triangle OBC is isosceles.

$2y + 130 = 180$

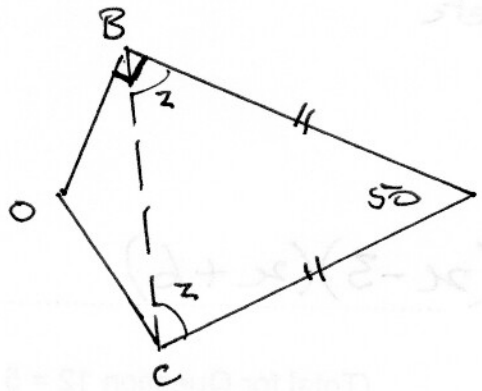
$2y = 50$

$y = 25°$

25 ..... ° (3)

(Total for Question 11 = 3 marks)

or



$50 + 2z = 180$

$2z = 130$

$z = 65$

$\angle OBC = 90 - 65$

$= 25°$

12. The diagram below shows a 5-sided shape.

All the corners are right angles.

All measurements are given in metres.

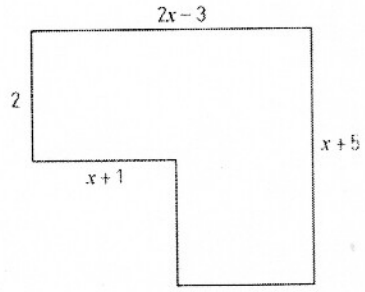
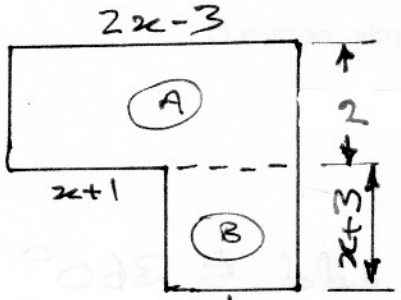


Diagram **NOT** accurately drawn

a Show that the area of the shape is $x^2 + 3x - 18$



Area (A) $= 2(2x-3) = 4x-6$

Area (B) $= (x-4)(x+3)$

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

$= x^2 - x - 12$

Total $x^2 - x - 12 + 4x - 6$

$= x^2 + 3x - 18$

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

$= x - 4$

(3)

b Factorise $x^2 + 3x - 18$

Factors of -18 are -1×18

-2×9

-3×6 – adds to $= 3$.

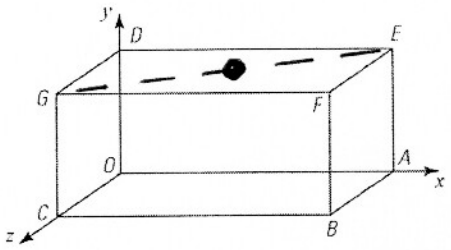
-6×3

etc

$(x-3)(x+6)$ ..... (2)

(Total for Question 12 = 5 marks)

13. The diagram shows a cuboid on a 3-D grid.



The coordinates of the vertex *F* are (6, 3, 2).

Work out the coordinates of the midpoint of *EG*.

E is at (6, 3, 0)

G is at (0, 3, 2)

Mid-point is $\left(\frac{6+0}{2}, \frac{3+3}{2}, \frac{0+2}{2}\right)$

$(3, 3, 1)$ ..... (3)

(Total for Question 13 = 3 marks)

14. Work out the value of $\frac{\sqrt{50}+\sqrt{8}}{\sqrt{8}}$

Give your answer in surd form.

$$\frac{\sqrt{50}+\sqrt{8}}{\sqrt{8}} = \frac{\sqrt{25\times2}+\sqrt{4\times2}}{\sqrt{4\times2}}$$

$$= \frac{5\sqrt{2}+2\sqrt{2}}{2\sqrt{2}} = \frac{7\sqrt{2}}{2\sqrt{2}} = 3\frac{1}{2}$$

$3\frac{1}{2}$ ..... (3)

(Total for Question 14 = 3 marks)

15. **a** Write $\frac{5}{x+1}+\frac{3}{x(x+1)}$ as a single fraction in its simplest form.

$= \frac{5x}{x(x+1)} + \frac{3}{x(x+1)}$

$\frac{5x+3}{x(x+1)}$ ..... (2)

b Simplify fully $\frac{x^2+3x-4}{2x^2-5x+3}$

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

$2x^2-5x+3 \rightarrow ac = 2\times3 = 6$, factors -1×-6, -2×-3 adds to -5. 1×6, 2×3

$= (2x-\frac{3}{1})(1x-\frac{2}{2}) = (2x-3)(x-1)$

$\frac{x^2+3x-4}{2x^2-5x+3} = \frac{(x+4)(x-1)}{(2x-3)(x-1)} = \frac{x+4}{2x-3}$ ..... (3)

(Total for Question 15 = 5 marks)

TOTAL FOR PAPER = 60 MARKS