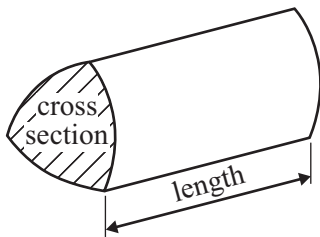


GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

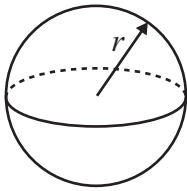
**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

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



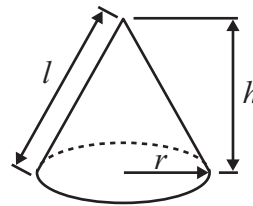
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**Surface area of sphere** =  $4\pi r^2$

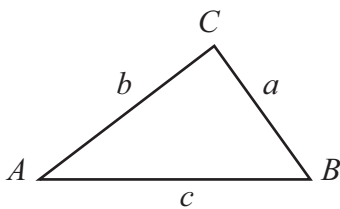


**Volume of cone** =  $\frac{1}{3} \pi r^2 h$

**Curved surface area of cone** =  $\pi r l$



**In any triangle ABC**



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

**Area of triangle** =  $\frac{1}{2} ab \sin C$

**Answer ALL SEVENTEEN questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

1. Each student at a college studies one of four languages.

The table shows the probability a student chosen at random studies German or Russian or French.

<b>Language</b>	German	Spanish	Russian	French
<b>Probability</b>	0.2		0.1	0.5

A student is chosen at random.

- (a) Work out the probability that the student studies Spanish.

.....  
(2)

There are 800 students at the college.

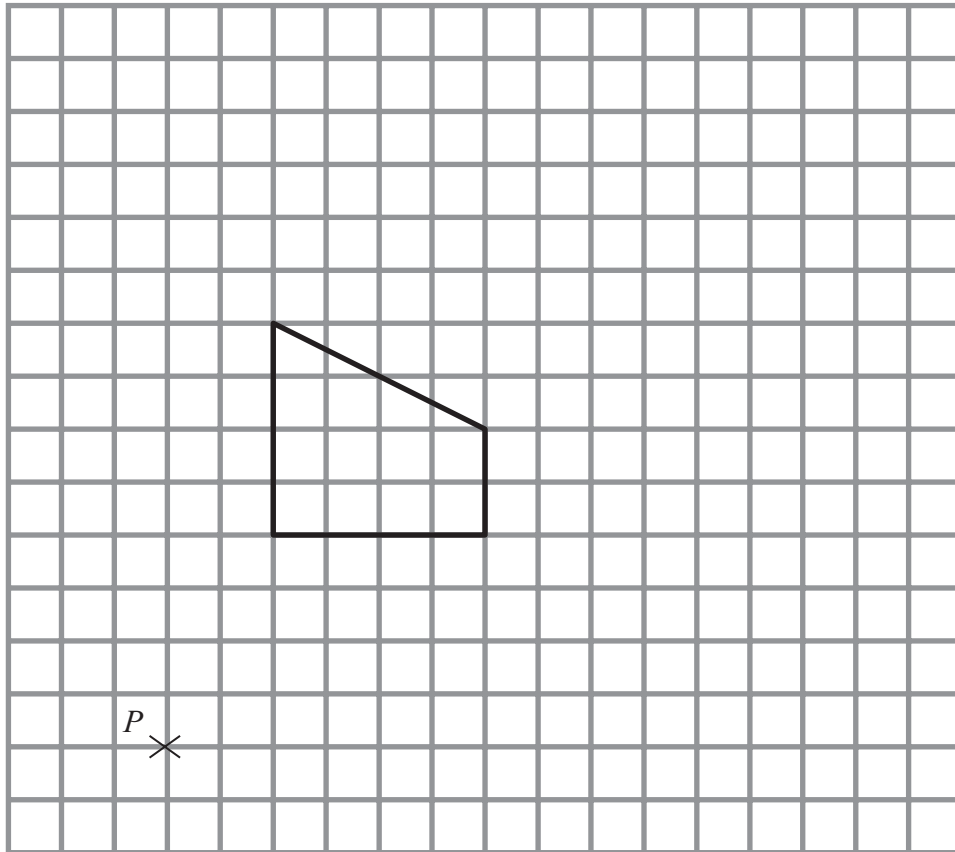
- (b) Work out the number of students who study German.

.....  
(2)

**(Total 4 marks)**

**Q1**

2.



On the grid, enlarge the shape with a scale factor of  $\frac{1}{2}$ , centre  $P$ .

(Total 3 marks)

Q2

3. (a) Express 45 as a product of its prime factors.

.....  
(2)

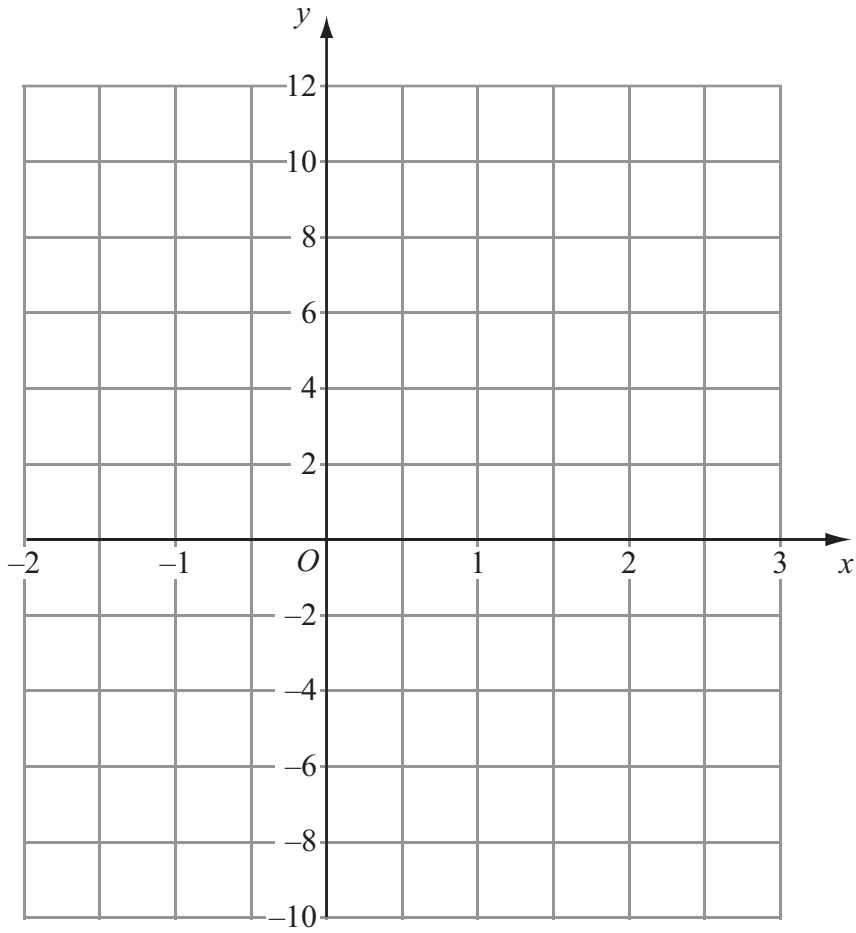
(b) Find the Highest Common Factor (HCF) of 45 and 30

.....  
(2)

(Total 4 marks)

Q3

4. On the grid, draw the graph of  $y = 4x - 2$



(Total 3 marks)

Q4

5. The diagram shows a circular pond with a path around it.

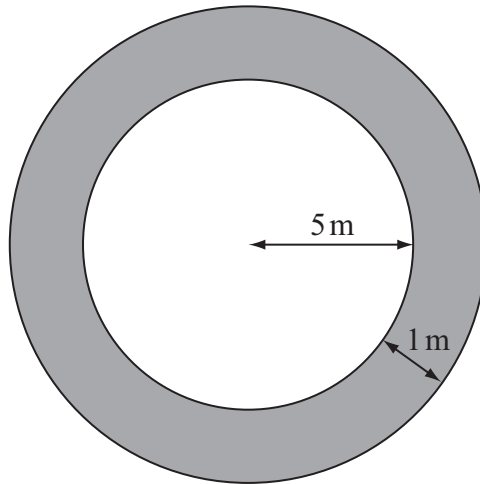


Diagram **NOT** accurately drawn

The pond has a radius of 5 m.  
The path has a width of 1 m.

Work out the area of the path.  
Give your answer correct to 3 significant figures.

..... m<sup>2</sup>

**(Total 3 marks)**

**Q5**

6. Here are the ages, in years, of 16 people.

36    48    18    25    36    28    45    30  
38    27    41    16    36    48    28    21

(a) Draw an ordered stem and leaf diagram to show this information.  
You must include a key.



Key:

(3)

(b) Find the median age.

..... years  
(2)

(Total 5 marks)

Q6

7. Bob has 120 beads.  
The beads are either red or green.

Bob gives  $\frac{3}{4}$  of the beads to his friend.

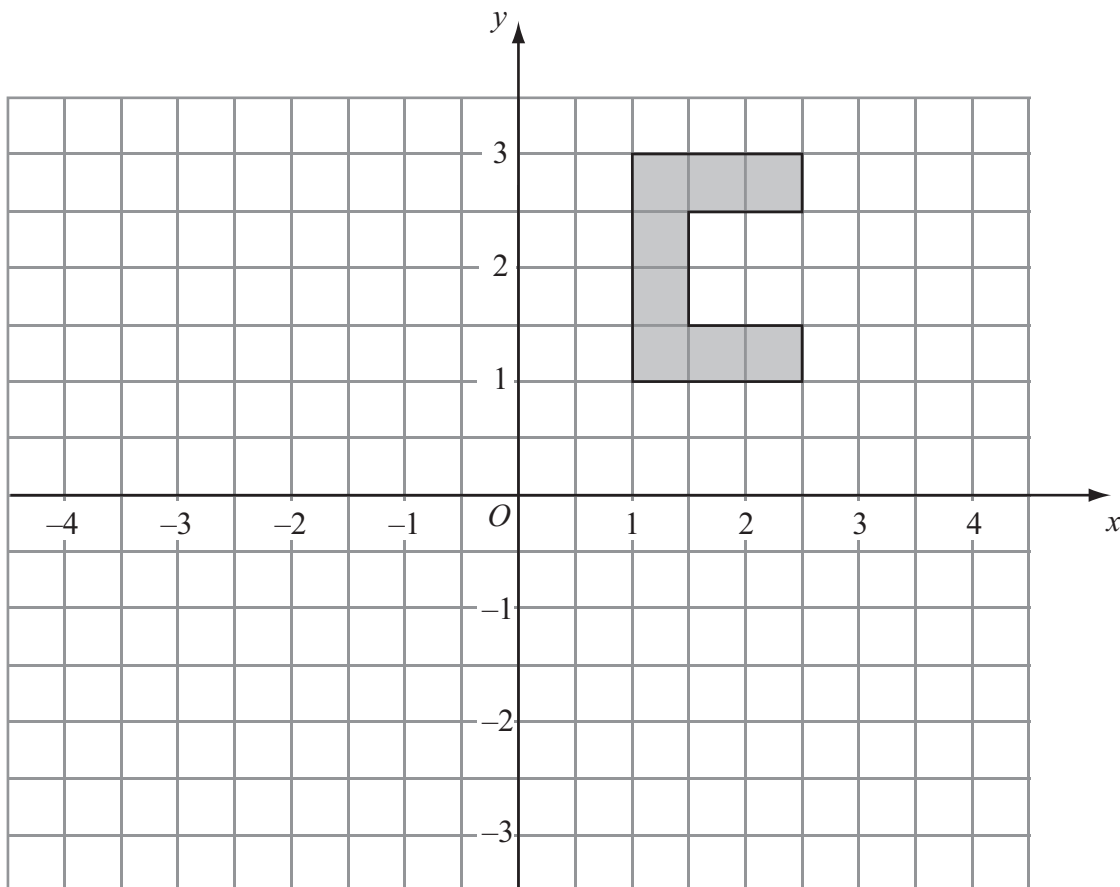
$\frac{2}{3}$  of the beads Bob now has are red.

Work out how many green beads Bob now has.

Q7

.....  
(Total 3 marks)

8.



Rotate the shape  $90^\circ$  clockwise, centre  $O$ .

Q8

(Total 2 marks)

9.

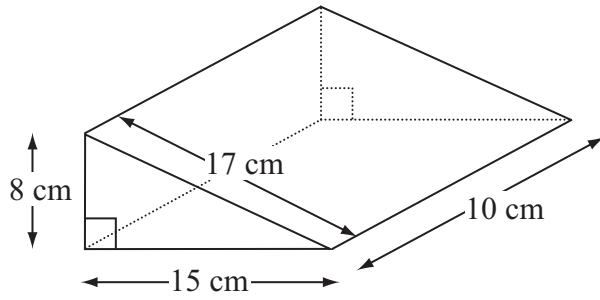


Diagram **NOT** accurately drawn

Work out the **total** surface area of the triangular prism.

.....

**(Total 4 marks)**

Q9



10. (a) Simplify  $6e + 5f + e - 3f$

.....  
(2)

(b) Solve  $4(2x - 1) = 3x - 19$

$x =$  .....  
(3)

(c) Solve  $\frac{y+4}{5} = 30$

$y =$  .....  
(2)

**(Total 7 marks)**

**Q10**

11. Bianca asked 32 women about the number of children they each had.

The table shows information about her results.

Number of children	Frequency	
0	9	
1	6	
2	7	
3	8	
4	2	
more than 4	0	

(a) Find the mode.

.....  
(1)

(b) Calculate the mean.

.....  
(3)

**(Total 4 marks)**

Q11

12. The equation

$$x^3 + 5x = 67$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.  
 Give your answer correct to one decimal place.  
 You must show **ALL** your working.

$x = \dots\dots\dots$

**(Total 4 marks)**

**Q12**

13. Use your calculator to work out

$$\sqrt{\frac{920 - 170 \tan 65^\circ}{0.012 + 0.034}}$$

(a) Write down all the figures on your calculator display.  
 You must write your answer as a decimal.

$\dots\dots\dots$

**(2)**

(b) Give your answer to part (a) correct to 3 significant figures.

$\dots\dots\dots$

**(1)**

**(Total 3 marks)**

**Q13**

14. The table shows six expressions.  
 $n$  is a positive integer.

$2n - 3$	$3n - 2$	$3(n + 4)$	$4n + 1$	$4(3n + 1)$	$2n + 1$
----------	----------	------------	----------	-------------	----------

(a) From the table, write the expression whose value is

(i) always even

.....

(ii) always a multiple of 3

.....

**(2)**

(b) From the table, write the expression which is a factor of  $4n^2 - 1$

.....

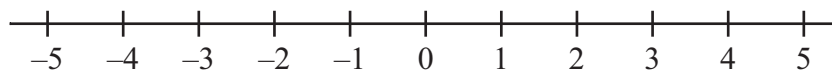
**(1)**

**(Total 3 marks)**

**Q14**

15. (a)  $x > -3$

Show this inequality on the number line.



**(2)**

(b) Solve the inequality  $7y + 36 \leq 8$

.....

**(2)**

**(Total 4 marks)**

**Q15**

16. (a) Simplify  $(c^2 k^5)^4$

.....  
(1)

(b) Expand and simplify  $(3x + 5)(4x - 1)$

.....  
(2)

(c) Solve  $x^2 - 3x - 10 = 0$

$x =$  .....  
(3)

(Total 6 marks)

Q16

17. The surface area of Earth is 510 072 000 km<sup>2</sup>.  
The surface area of Jupiter is  $6.21795 \times 10^{10}$  km<sup>2</sup>.

The surface area of Jupiter is greater than the surface area of Earth.  
How many times greater?  
Give your answer in standard form.

.....  
(Total 3 marks)

Q17