Questions

Q1.

Dimitar has 20 sweets.
Pip also has 20 sweets.

Dimitar gives Pip *x* sweets.

Dimitar then eats 5 of his sweets.
Pip then eats half of her sweets.

Write expressions for the number of sweets Dimitar and Pip now have.

Dimitar ..... Pip .....

(Total for question = 3 marks)

(**Q18 1MA1/1F/S2, Specimen papers**)

Q2.

Gabriel thinks of a number.

He multiplies his number by 5 and then adds 7

His answer is 72

What number did Gabriel think of?

.....

(Total for question = 3 marks)

(**Q11 1MA1/3F, June 2023**)

Q3.

A shop sells apples and oranges.

There are 6 apples in each pack of apples.

There are 7 oranges in each bag of oranges.

The shop sells x packs of apples and y bags of oranges.

Write an expression, in terms of x and y, for the total number of apples and oranges the shop sells.

.....

(Total for question = 2 marks)

(**Q12 1MA1/3F, Nov 2024**)

Q4.

There are y boats on a lake.
There are 7 people in each boat.

Write an expression, in terms of y, for the total number of people in the boats.

.....

(Total for question = 1 mark)

(**Q07 1MA1/2F, June 2019**)

Q5.

Naomi has b bags of apples and c crates of apples.

There are 5 apples in each bag.
There are 28 apples in each crate.

Naomi has a total of T apples.

Write a formula for T in terms of b and c.

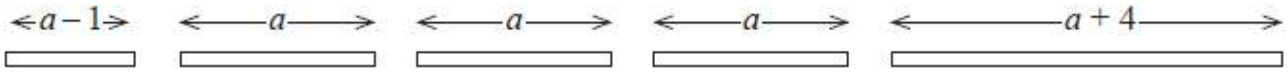
.....

(Total for question = 3 marks)

(**Q18 1MA1/1F, June 2023**)

Q6.

Here are five straight rods.



All measurements are in centimetres.

The total length of the five rods is *L* cm.

Find a formula for *L* in terms of a.
Write your formula as simply as possible.

.....

(Total for question = 3 marks)

(**Q06 1MA1/1F, Nov 2017**)

Q7.

Ben is n years old.
Chloe is twice as old as Ben.
Dan is five years younger than Ben.

The total of Ben's age, Chloe's age and Dan's age is T years.

(a) Find a formula for T in terms of n.

.....

(3)

(b) In the table below, put a tick (✓) in the box next to the identity.

$3h + 2 = 14$	
$3a + 4b - 2c$	
$A = \pi r^2$	
$5m - 3m = 2m$	
$x + 7 \leqslant 12$	

(1)

(Total for question = 4 marks)

(**Q18 1MA1/2F, Nov 2019**)

Q8.

(a) Simplify $4c + 7d + 3c - d$

.....

(2)

(b) Solve $5(2m - 6) = 40$

m = ...

(3)

There are x sweets in a box.

There are y sweets in a packet.

(c) Write an expression, in terms of x and y, for the total number of sweets in 3 boxes and 2 packets.

.....

(2)

(Total for question = 7 marks)

(**Q14 1MA1/2F, Nov 2022**)

Q9.

The point P has coordinates (3, 4)
The point Q has coordinates (a, b)

A line perpendicular to PQ is given by the equation $3x + 2y = 7$

Find an expression for b in terms of a.

.....

(Total for question = 5 marks)

(**Q19 1MA1/1H, June 2018**)

Q10.

Cups are sold in packs and in boxes.

There are 12 cups in each pack.
There are 18 cups in each box.

Alison buys p packs of cups and b boxes of cups.

Write down an expression, in terms of p and b, for the total number of cups Alison buys.

.....

(Total for question = 2 marks)

(**Q02 1MA1/3F, June 2017**)

Q11.

You can use this rule to work out the total cost, in pounds, of hiring a carpet cleaner.

Multiply the number of days by 7.8 and then add 12

Andy hires a carpet cleaner.
The total cost is £82.20

(a) Work out the number of days Andy hires the carpet cleaner for.

..... days

(2)

Chloe hires a carpet cleaner for y days.
The total cost is £T.

(b) Write down a formula for T in terms of y.

.....

(2)

(Total for question = 4 marks)

(**Q14 1MA1/3F/S2, Specimen papers**)

Q12.

1 litre of a liquid **P** has a mass of p grams.
1 litre of a liquid **Q** has a mass of q grams.

A liquid **R** is made by mixing a volume of liquid **P** with a volume of liquid **Q** in the ratio 3 : 7

Find an expression, in terms of p and q, for the mass of 50 litres of liquid **R**.

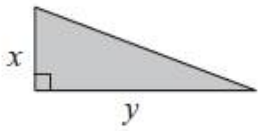
..... grams

(Total for question = 3 marks)

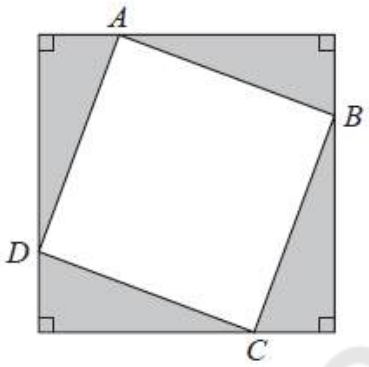
(**Q09 1MA1/1H/M2, Specimen papers**)

Q13.

Here is a right–angled triangle.



Four of these triangles are joined to enclose the square *ABCD* as shown below.

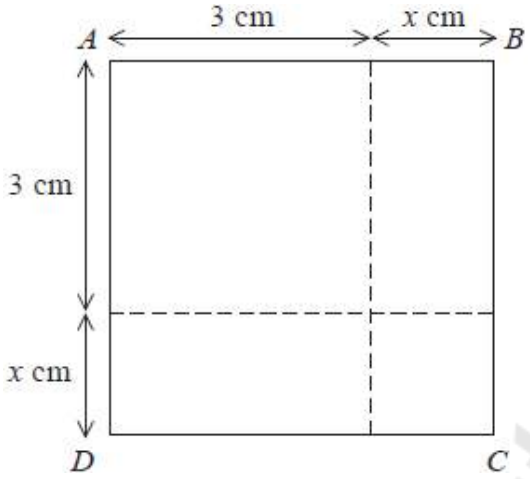


Show that the area of the square *ABCD* is $x^2 + y^2$

(Total for question = 3 marks)

(**Q07 1MA1/3H/S2, Specimen papers**)

Q14.



The area of square *ABCD* is 10 cm^2.

Show that $x^2 + 6x = 1$

(Total for question = 3 marks)

(**Q24 1MA1/1F, June 2017**)

Q15.

Pat throws a fair coin n times.

Find an expression, in terms of n, for the probability that Pat gets at least 1 head and at least 1 tail.

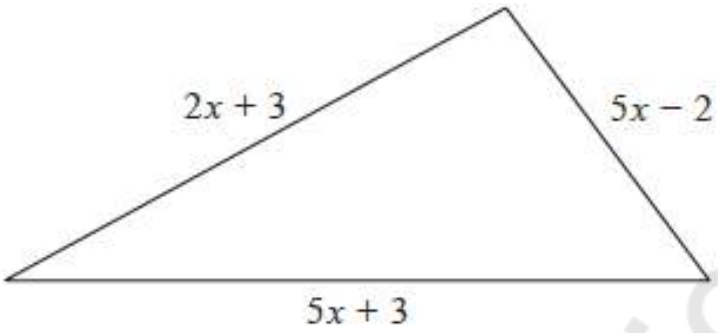
.....

(Total for question = 2 marks)

(**Q20 1MA1/3H, Nov 2021**)

Q16.

The perimeter of a square has the same length as the perimeter of this triangle.



All measurements are in centimetres.

Find an expression, in terms of x, for the length of a side of the square.
Give your answer in its simplest form.

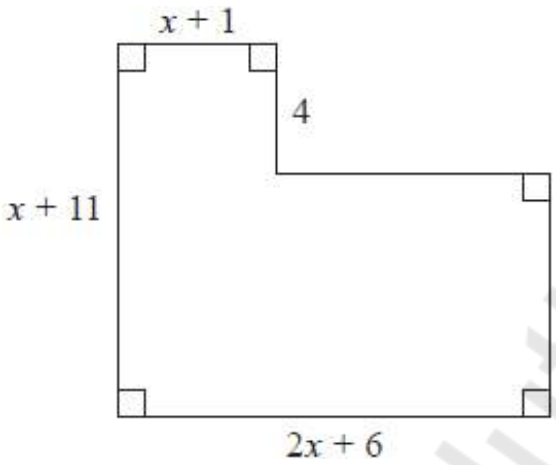
.....

(Total for question = 3 marks)

(**Q20 1MA1/1F/M2, Specimen papers**)

Q17.

Here is a shape with all its measurements in centimetres.



The area of the shape is A cm^2

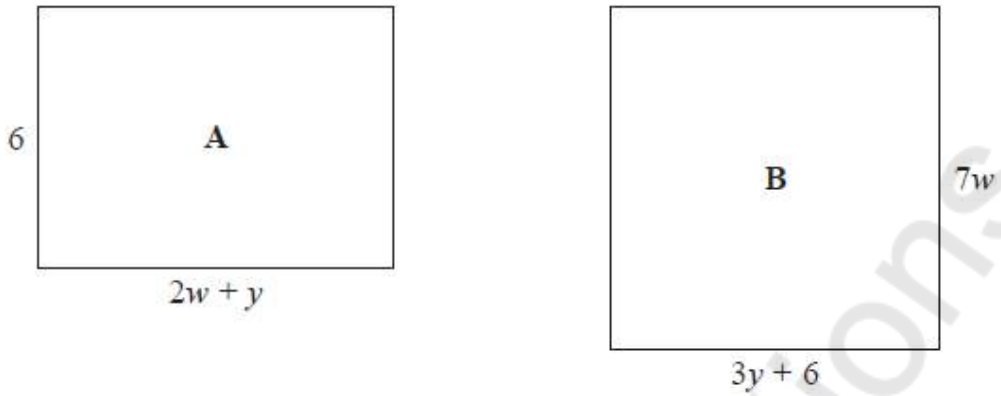
Show that $A = 2x^2 + 24x + 46$

(Total for question = 3 marks)

(**Q14 1MA1/1H, Nov 2021**)

Q18.

The diagram shows two rectangles, **A** and **B**.



All measurements are in centimetres.

The area of rectangle **A** is equal to the area of rectangle **B**.

Find an expression for y in terms of w.

.....

(Total for question = 4 marks)

(**Q11 1MA1/1H, Nov 2021**)

Q19.

There are only red counters and yellow counters in bag **A**.

number of red counters : number of yellow counters = 3 : 5

There are only green counters and blue counters in bag **B**.
The number of counters in bag **B** is half the number of counters in bag **A**.

Given that there are x red counters in bag **A**,

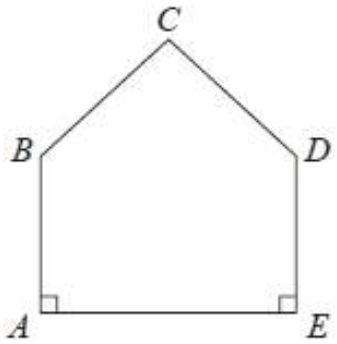
use algebra to show that the total number of counters in bag **A** and bag **B** is $4x$

(Total for question = 3 marks)

(**Q10 1MA1/3H, June 2024**)

Q20.

The diagram shows a pentagon.
The pentagon has one line of symmetry.



$AE = 4x$
$AB = 2x + 1$
$BC = x + 2$

All these measurements are given in centimetres.

The perimeter of the pentagon is 18 cm.

(a) Show that $10x + 6 = 18$

(3)

(b) Find the value of x.

$x =$ .....

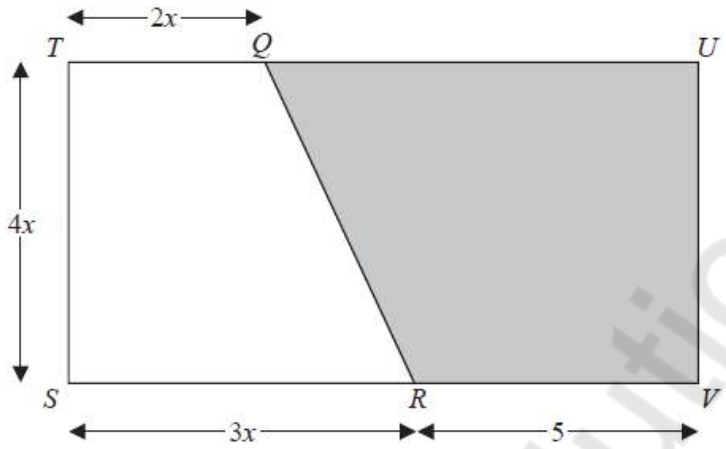
(2)

(Total for question = 5 marks)

(**Q17 1MA1/3F, Nov 2018**)

Q21.

The diagram shows rectangle *STUV*.
TQU and *SRV* are straight lines.
All measurements are in cm.



The area of trapezium *QUVR* is A cm^2

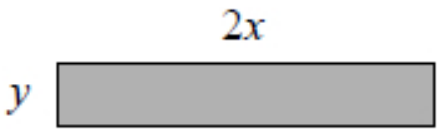
Show that $A = 2x^2 + 20x$

(Total for question = 3 marks)

(**Q07 1MA1/3H, June 2022**)

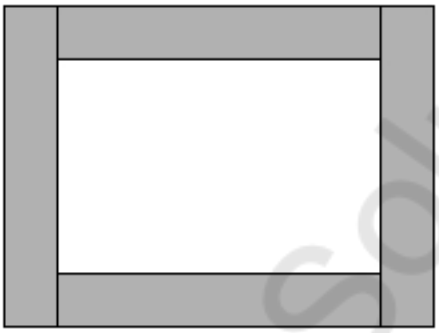
Q22.

Here is a rectangle made of card.



The measurements in the diagram are in centimetres.

Lily fits four of these rectangles together to make a frame.



The perimeter of the inside of the frame is P cm.

(a) Show that $P = 8x - 4y$

(2)

Magda says,

"When x and y are whole numbers, P is always a multiple of 4."

(b) Is Magda correct?
You must give a reason for your answer.

.....

.....

(2)

(Total for question = 4 marks)

(**Q17 1MA1/3F/N, Specimen papers**)

Q23.

(a) Write 196 minutes in hours and minutes.

..... hours ..... minutes

(2)

A train travels x miles in 2 hours.

(b) Write down an expression, in terms of x, for the average speed of the train.

..... miles per hour

(1)

(Total for question = 3 marks)

(**Q11 1MA1/3F, Nov 2021**)

Q24.

The length of a line is x centimetres.

Write down an expression, in terms of x, for the length of the line in millimetres.

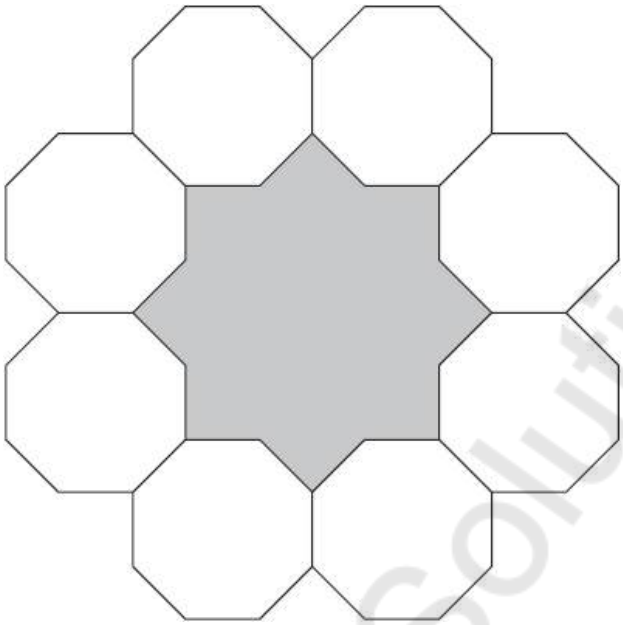
.....

(Total for question = 1 mark)

(**Q13 1MA1/1F, June 2019**)

Q25.

The diagram shows 8 identical regular octagons joined to enclose a shaded shape.



Each octagon has sides of length *a*.

Find, in terms of *a*, an expression for the area of the shaded shape.

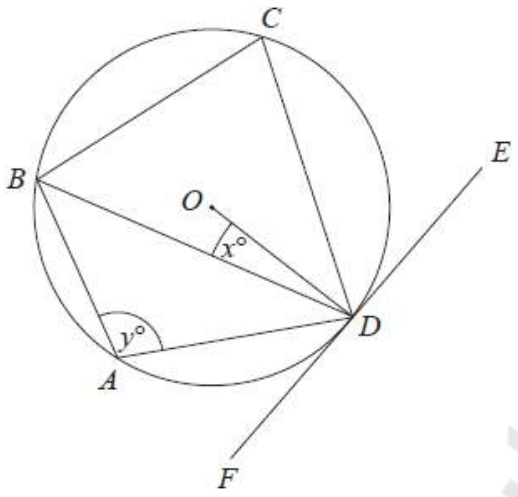
Give your answer in the form $p(2+\sqrt{2})a^2$ where *p* is an integer.
You must show all your working.

.....

(Total for question = 5 marks)

(**Q24 1MA1/2H, June 2023**)

Q26.



A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
FDE is a tangent to the circle.

(a) Show that $y - x = 90$

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

(3)

Dylan was asked to give some possible values for *x* and *y*.

He said,

"*y* could be 200 and *x* could be 110, because 200 – 110 = 90"

(b) Is Dylan correct?

You must give a reason for your answer.

.....

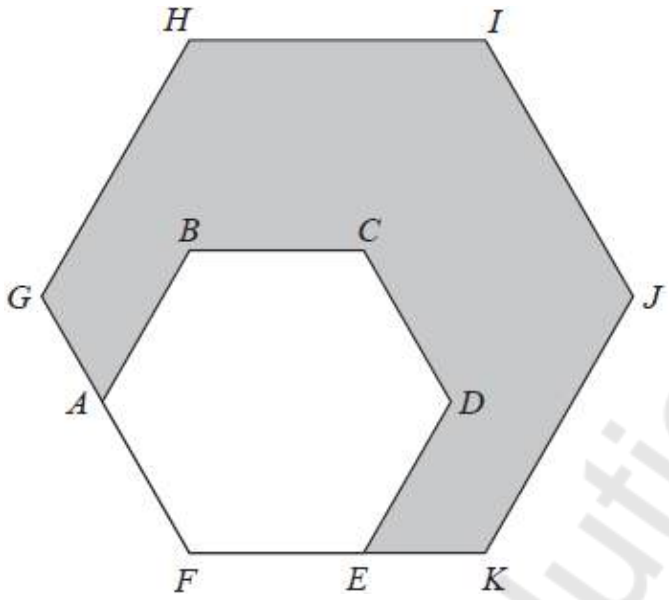
.....

(1)

(Total for question = 4 marks)

(**Q13 1MA1/2H, June 2018**)

Q27.



ABCDEF is a regular hexagon with sides of length *x*.
This hexagon is enlarged, centre *F*, by scale factor *p* to give hexagon *FGHIJK*.

Show that the area of the shaded region in the diagram is given by $\frac{3\sqrt{3}}{2}(p^2-1)x^2$

(Total for question = 4 marks)

(**Q19 1MA1/3H, Nov 2020**)