

Write your name here

Surname

Other Names

Mathematics

**November 2017 Paper 2 (Calculator Allowed)
Part 2 (Second half of the paper)
Edexcel Higher Tier**

Time: 45 minutes

Q	Topic	Max Mark	My Marks
13	Repeated Percentage Change	5	
14	Inequalities on Graphs	3	
15	The Product Rule for Counting	3	
16	Solving Quadratics	2	
17	Histograms	5	
18	Iteration	1	
19	The Equation of a Line, Parallel Lines	4	
20	Area of a Sector, Trigonometry	5	
21	Conditional Probability	4	
22	Inverse Functions, Simultaneous Equations	5	
23	Surds, Solving Algebraic Fractions	5	
	Total	42	

For worked solutions and video solutions visit mathsgenie.co.uk

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13 At the beginning of 2009, Mr Veale bought a company.
The value of the company was £50 000

Each year the value of the company increased by 2%.

- (a) Calculate the value of the company at the beginning of 2017
Give your answer correct to the nearest £100

£
(2)

At the beginning of 2009 the value of a different company was £250 000
In 6 years the value of this company increased to £325 000

This is equivalent to an increase of $x\%$ each year.

- (b) Find the value of x .
Give your answer correct to 2 significant figures.

.....
(3)

(Total for Question 13 is 5 marks)



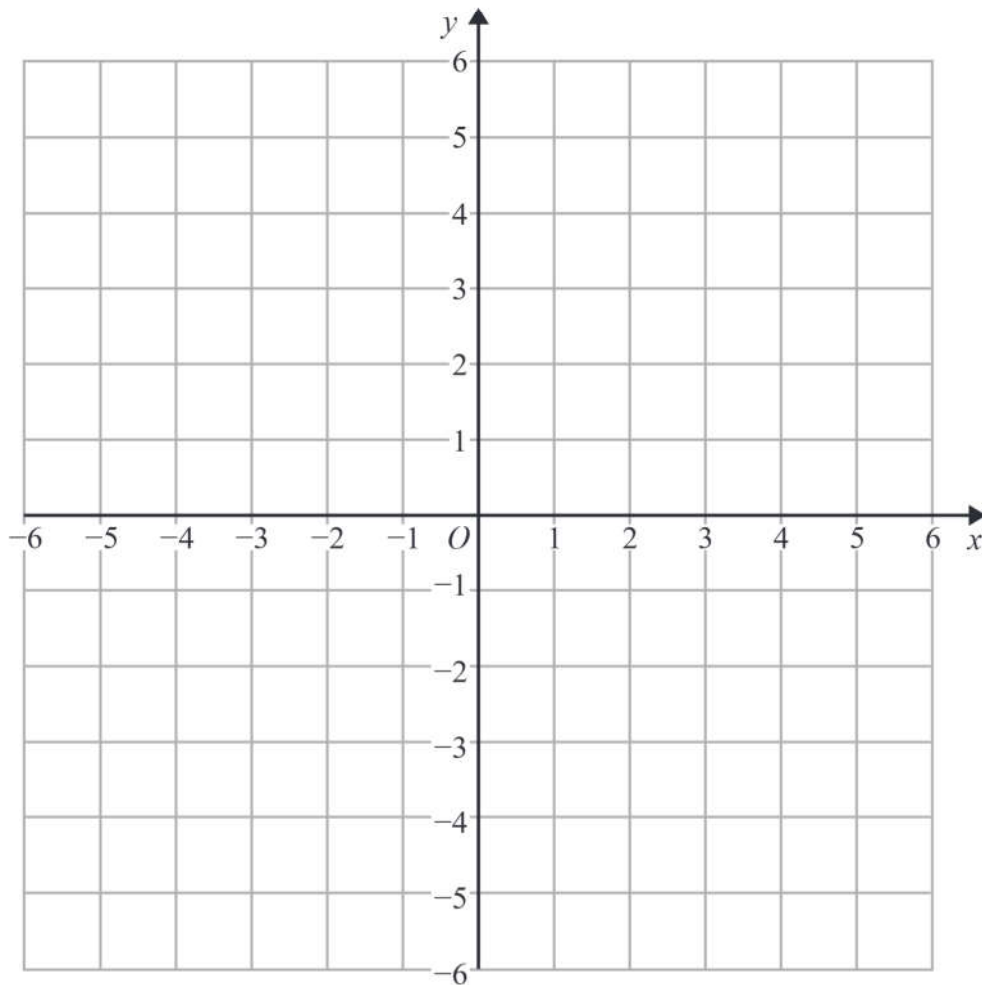
14 On the grid, shade the region that satisfies all these inequalities.

$$y > 1$$

$$x + y < 5$$

$$y > 2x$$

Label the region **R**.



(Total for Question 14 is 3 marks)

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15 Tracey is going to choose a main course and a dessert in a cafe.
She can choose from 8 main courses and 7 desserts.

Tracey says that to work out the number of different ways of choosing a main course and a dessert you add 8 and 7

- (a) Is Tracey correct?
You must give a reason for your answer.

.....
.....
(1)

12 teams play in a competition.
Each team plays each other team exactly once.

- (b) Work out the total number of games played.

.....
(2)

(Total for Question 15 is 3 marks)

16 Solve $(x - 2)^2 = 3$

Give your solutions correct to 3 significant figures.

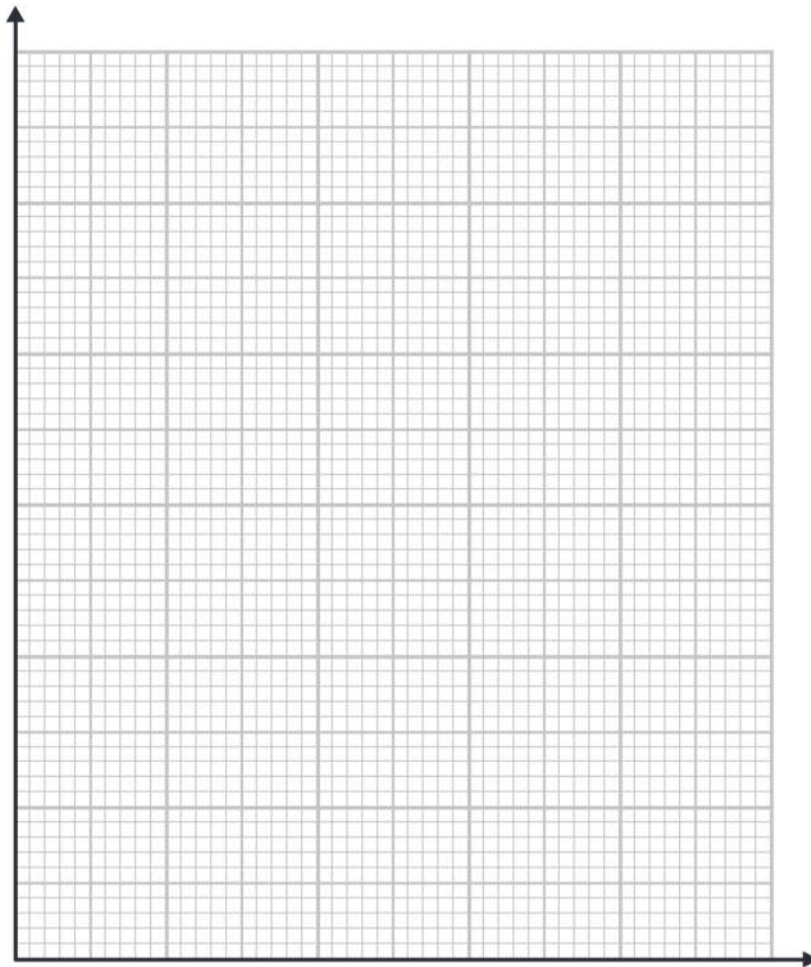
.....
(Total for Question 16 is 2 marks)



17 The table gives information about the heights of 150 students.

Height (h cm)	Frequency
$140 < h \leq 150$	15
$150 < h \leq 155$	30
$155 < h \leq 160$	51
$160 < h \leq 165$	36
$165 < h \leq 180$	18

(a) On the grid, draw a histogram for this information.



(3)

(b) Work out an estimate for the fraction of the students who have a height between 150 cm and 170 cm.

(2)

(Total for Question 17 is 5 marks)



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18 At time $t = 0$ hours a tank is full of water.

Water leaks from the tank.

At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

$$\begin{aligned} V_0 &= 2000 \\ V_{t+1} &= kV_t \end{aligned}$$

write down the value of k .

$k = \dots\dots\dots$

(Total for Question 18 is 1 mark)



19 A triangle has vertices P , Q and R .

The coordinates of P are $(-3, -6)$

The coordinates of Q are $(1, 4)$

The coordinates of R are $(5, -2)$

M is the midpoint of PQ .

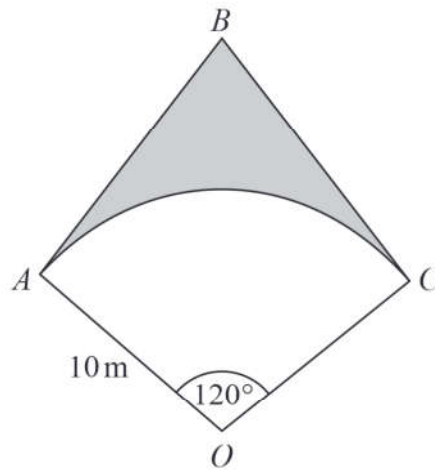
N is the midpoint of QR .

Prove that MN is parallel to PR .

You must show each stage of your working.

(Total for Question 19 is 4 marks)





OAC is a sector of a circle, centre O , radius 10 m .

BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

..... m^2

(Total for Question 20 is 5 marks)



- 21 There are 12 counters in a bag.
There is an equal number of red counters, blue counters and yellow counters in the bag.
There are no other counters in the bag.

3 counters are taken at random from the bag.

- (a) Work out the probability of taking 3 red counters.

.....
(2)

The 3 counters are put back into the bag.

Some more counters are now put into the bag.
There is still an equal number of red counters, blue counters and yellow counters in the bag.
There are no counters of any other colour in the bag.

3 counters are taken at random from the bag.

- (b) Is it now less likely or equally likely or more likely that the 3 counters will be red?
You must show how you get your answer.

(2)

(Total for Question 21 is 4 marks)



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22 The functions f and g are such that

$$f(x) = 5x + 3 \quad g(x) = ax + b \quad \text{where } a \text{ and } b \text{ are constants.}$$

$$g(3) = 20 \quad \text{and} \quad f^{-1}(33) = g(1)$$

Find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(Total for Question 22 is 5 marks)



23 S is a geometric sequence.

- (a) Given that $(\sqrt{x} - 1)$, 1 and $(\sqrt{x} + 1)$ are the first three terms of S, find the value of x .
You must show all your working.

.....
(3)

- (b) Show that the 5th term of S is $7 + 5\sqrt{2}$

(2)

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

