GCSE MATHEMATICS · HIGHER

Targeting Grade 9

Paper 7 · Non-calculator · 50 minutes · 40 marks

Name ..... **Date** .....

Answer **all** questions. Show all your working: answers without working may not get full marks. Diagrams are **not** accurately drawn. You must **not** use a calculator.

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1 x and y are integers such that

$$(5 - \sqrt{x})^2 = y - 20\sqrt{2}$$

Work out the value of x and the value of y.

$x =$ .....

$y =$ .....

(Total for Question 1 is 3 marks)

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2 Prove that the square of any odd number is always one more than a multiple of 8

(Total for Question 2 is 4 marks)

3 Write

$$\frac{2}{x+3} - \frac{x-9}{x^2-9}$$

as a single fraction in its simplest form.

.....

(Total for Question 3 is 4 marks)

4 On any day, the probability that it rains is 0.3

If it rains, the probability that Sam is late for school is 0.4

If it does not rain, the probability that Sam is late for school is 0.1

(a) Work out the probability that Sam is late for school on a day chosen at random.

.....

(2)

(b) On one day, Sam is late for school.

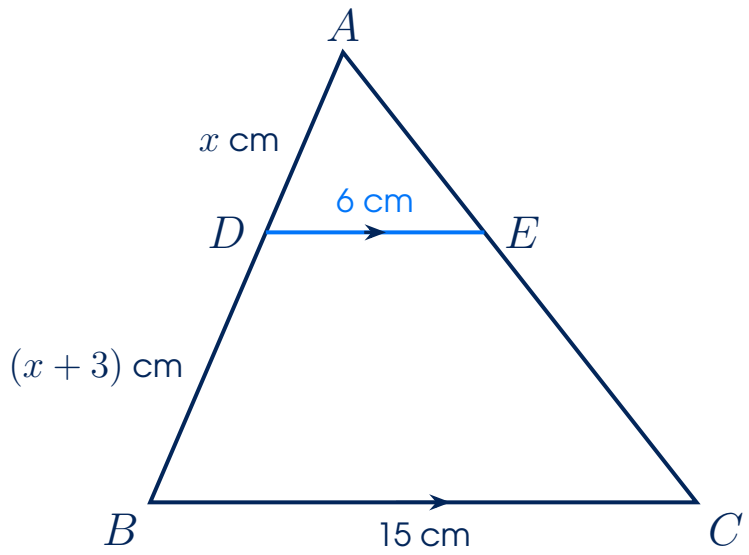
Work out the probability that it rained on that day.

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(3)

(Total for Question 4 is 5 marks)

5



ADB and AEC are straight lines.
DE is parallel to BC.
$AD = x$ cm, $DB = (x + 3)$ cm, $DE = 6$ cm, $BC = 15$ cm

(a) Work out the value of x.

$x =$ .....

(3)

(b) Work out the ratio area of triangle ADE : area of trapezium $DBCE$
Give your answer in its simplest form.

.....

(3)

(Total for Question 5 is 6 marks)

6 The line with equation $y = 2x - 3$ meets the curve with equation $y = x^2 - 4x + 5$ at the points A and B.

O is the origin.

Work out the area of triangle OAB.

You must show all your working.

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(Total for Question 6 is 6 marks)

7 C is the circle with equation $x^2 + y^2 = 20$

The tangent to C at the point P has gradient 2

(a) Work out the two possible pairs of coordinates of P.

P (,)

P (,)

(4)

(b) Find the equations of the two tangents to C that have gradient 2

.....

.....

(2)

(Total for Question 7 is 6 marks)

8 $f(x) = x^2 - 4$

The graph of $y = f(x)$ is reflected in the x-axis.

The reflected graph is then translated by the vector $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ to give the graph **G**.

(a) Show that **G** has equation $y = -x^2 + 6x - 5$

(3)

(b) Find the exact x-coordinates of the points where **G** meets the graph of $y = f(x)$

Give your answers in the form $\dfrac{a \pm \sqrt{b}}{c}$ where a, b and c are integers.

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(3)

(Total for Question 8 is 6 marks)

TOTAL FOR PAPER IS 40 MARKS