Write your name here

| Surname | Other Names |
|---|---|
| | |

# Mathematics

## June 2018 Paper 2 (Calculator Allowed)
## Part 2 (Second half of the paper)
## Edexcel Higher Tier

Time: 45 minutes

| Q | Topic | Max Mark | My Marks |
|---|---|---|---|
| 12 | Direct and Inverse Proportion Graphs | 2 | |
| 13 | Circle Theorems | 4 | |
| 14 | Gradient at a Point (drawing a tangent) | 3 | |
| 15 | Conditional Probability | 5 | |
| 16 | Equation of a Circle, Simultaneous Equations on a Graph | 5 | |
| 17 | Histograms | 4 | |
| 18 | 3d Trigonometry | 4 | |
| 19 | Volume and Surface Area of a Sphere | 5 | |
| 20 | Surds, Rationalise the Denominator | 2 | |
| 21 | Bounds, Compound Measures (Density) | 5 | |
| | Total | 39 | |

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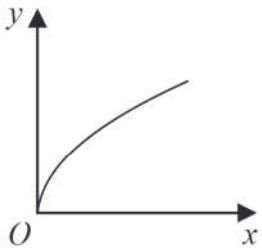
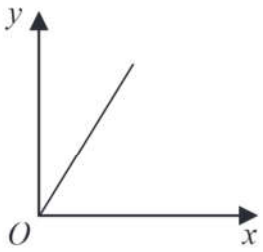
**12**

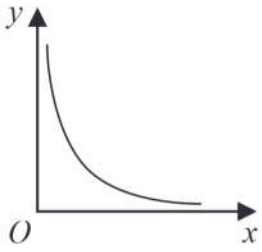
Graph A



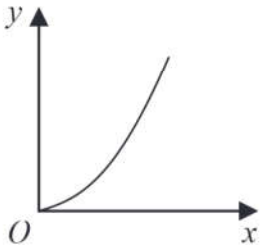

Graph B




Graph C




Graph D



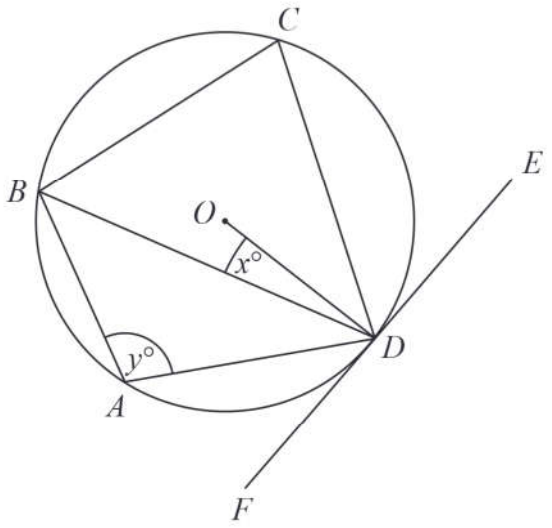

The graphs of $y$ against $x$ represent four different types of proportionality.

Match each type of proportionality in the table to the correct graph.

| Type of proportionality | Graph letter |
|---|---|
| $y \propto x$ | |
| $y \propto x^2$ | |
| $y \propto \sqrt{x}$ | |
| $y \propto \frac{1}{x}$ | |

**(Total for Question 12 is 2 marks)**

**13**




$A$, $B$, $C$ 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.

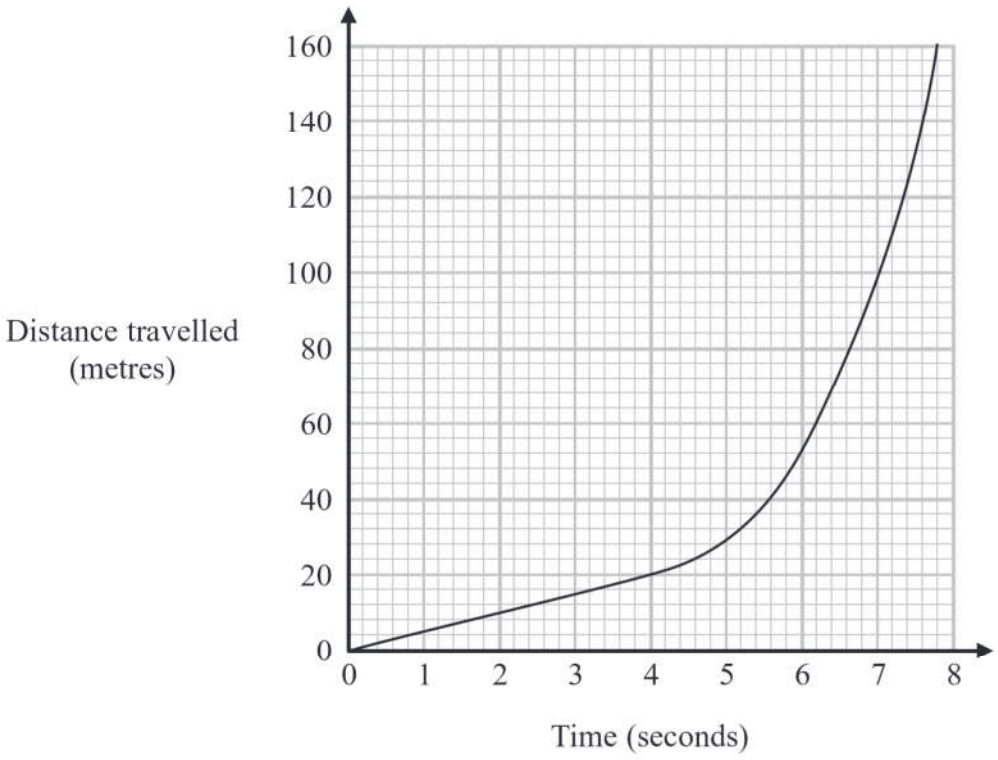
.....

.....

**(1)**

**(Total for Question 13 is 4 marks)**

**14** The distance-time graph shows information about part of a car journey.




Use the graph to estimate the speed of the car at time 5 seconds.

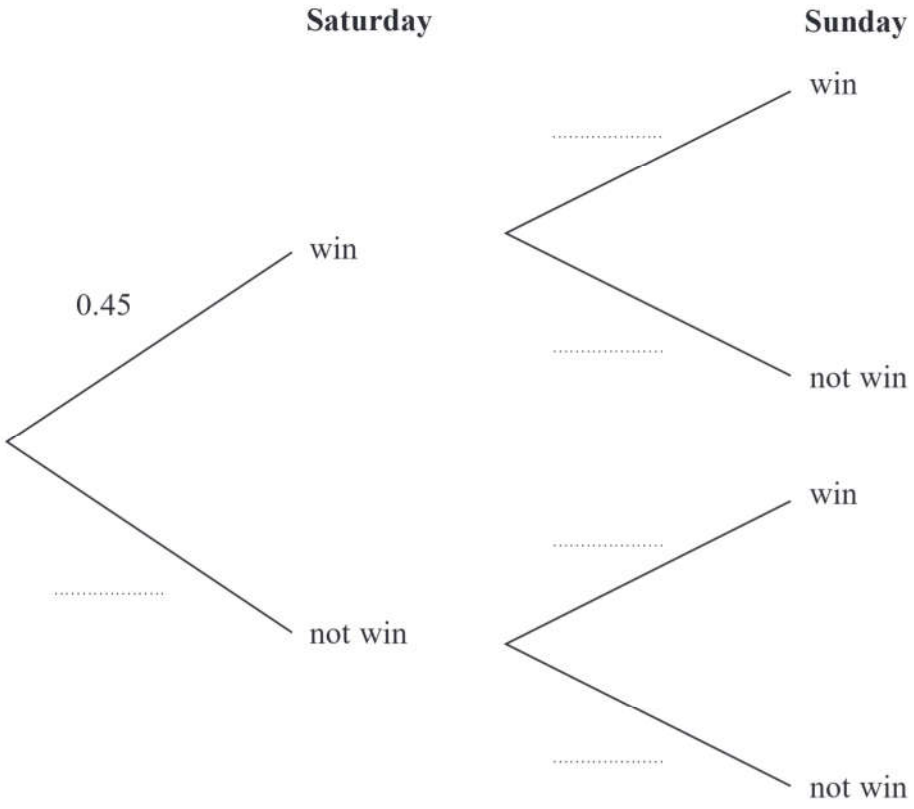
..... m/s

**(Total for Question 14 is 3 marks)**

**15** A darts team is going to play a match on Saturday and on Sunday.
The probability that the team will win on Saturday is 0.45

If they win on Saturday, the probability that they will win on Sunday is 0.67
If they do **not** win on Saturday, the probability that they will win on Sunday is 0.35

(a) Complete the probability tree diagram.




(2)

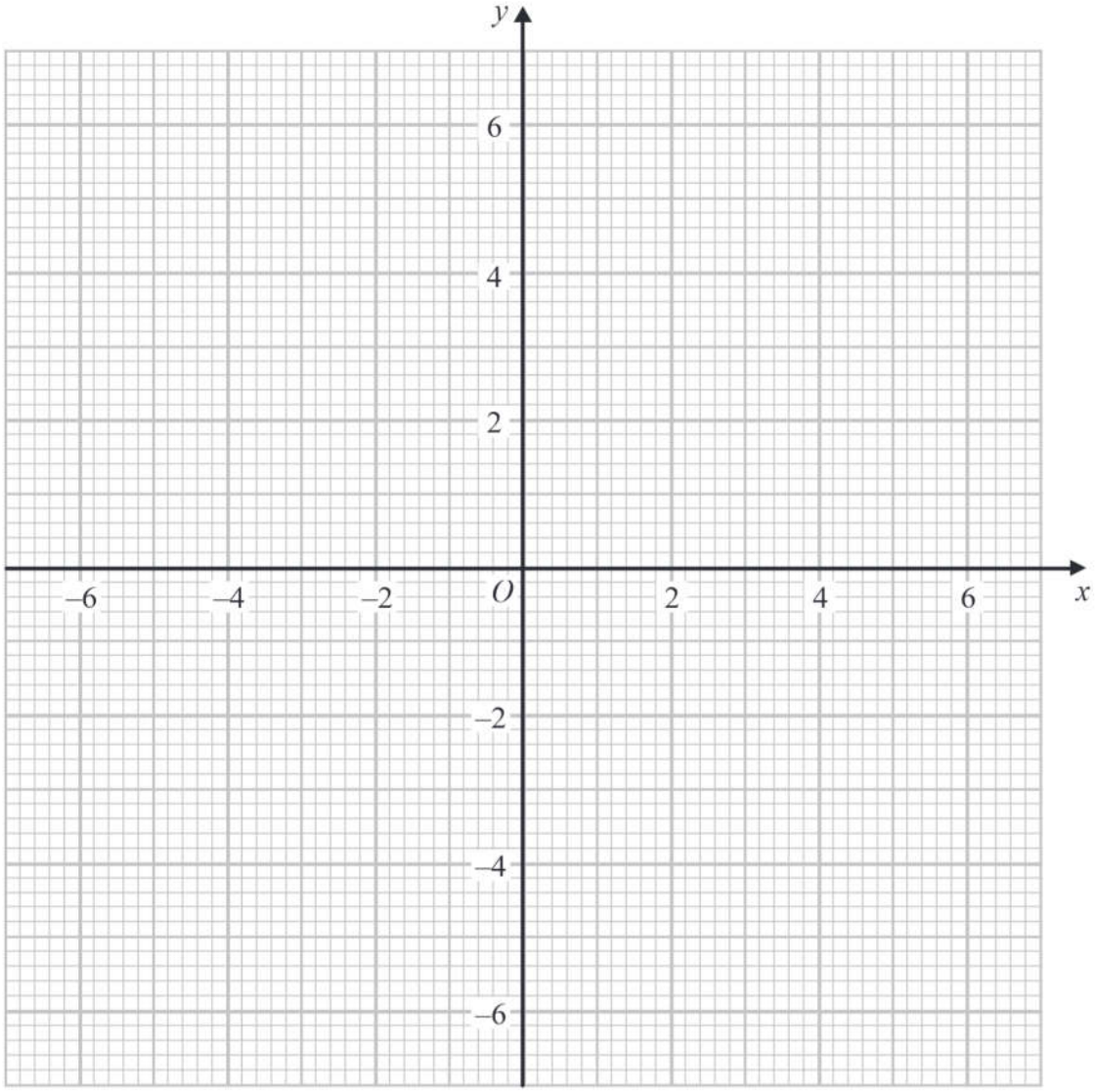
(b) Find the probability that the team will win exactly one of the two matches.

.....

(3)

**(Total for Question 15 is 5 marks)**

**16** (a) On the grid, draw the graph of $x^2 + y^2 = 12.25$




**(2)**

(b) Hence find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 12.25$$
$$2x + y = 1$$

.....

**(3)**

**(Total for Question 16 is 5 marks)**

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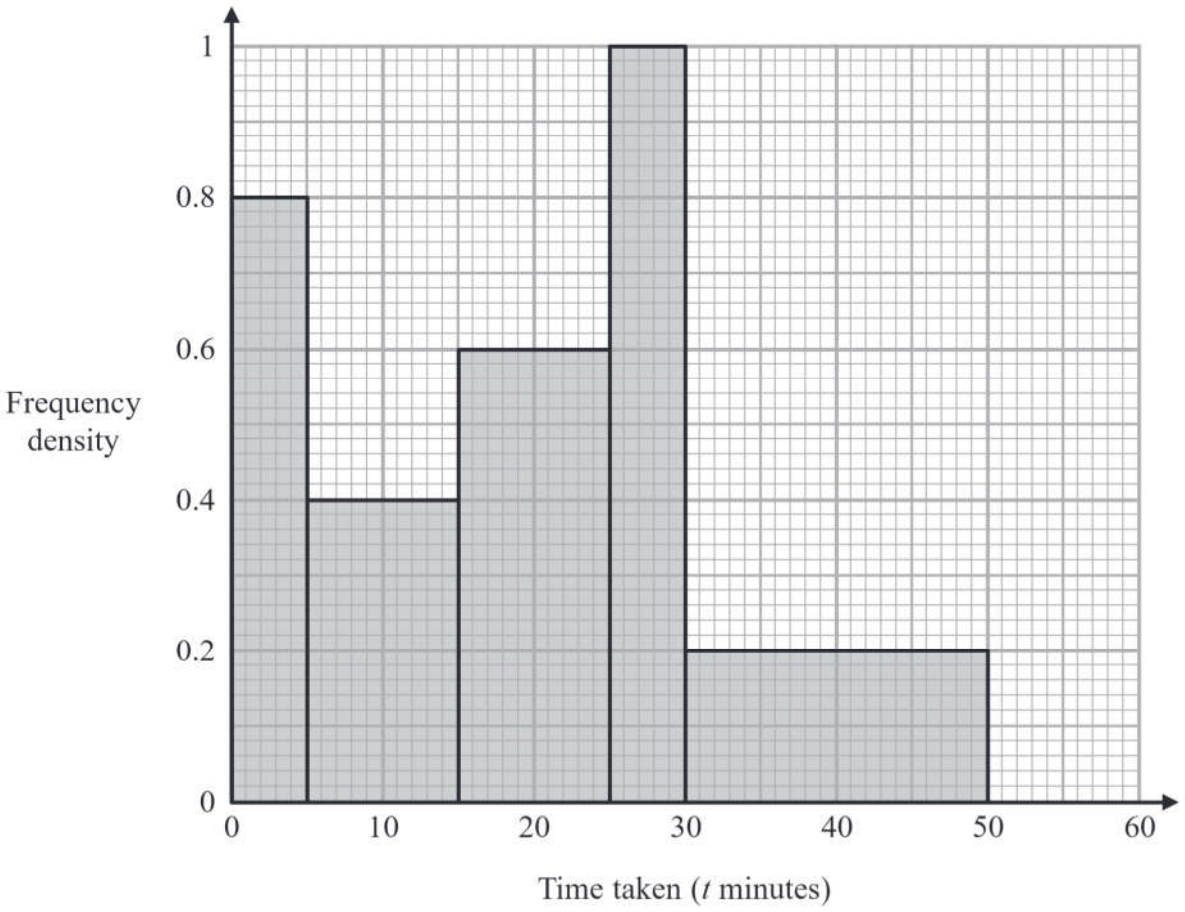
**17** The histogram shows information about the times taken by some students to finish a puzzle.




(a) Complete the frequency table for this information.

| Time taken ($t$ minutes) | Frequency |
|---|---|
| $0 < t \leqslant 5$ | 4 |
| $5 < t \leqslant 15$ | |
| $15 < t \leqslant 25$ | |
| $25 < t \leqslant 30$ | |
| $30 < t \leqslant 50$ | |

(2)

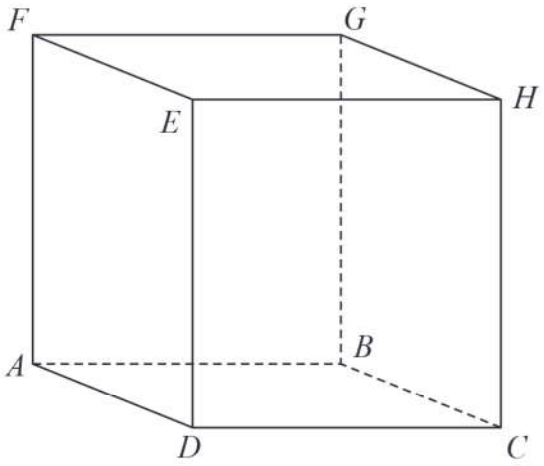
(b) Find an estimate for the lower quartile of the times taken to finish the puzzle.

..... minutes

(2)

**(Total for Question 17 is 4 marks)**

**18** *ABCDEFGH* is a cuboid.



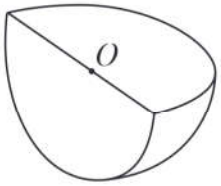

$AB = 7.3\,\text{cm}$
$CH = 8.1\,\text{cm}$
Angle $BCA = 48°$

Find the size of the angle between $AH$ and the plane $ABCD$.
Give your answer correct to 1 decimal place.

.....°

**(Total for Question 18 is 4 marks)**

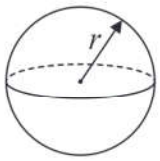
**19** Shape **S** is one quarter of a solid sphere, centre $O$.




Shape **S**

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

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




The volume of **S** is $576\pi$ cm$^3$

Find the surface area of **S**.
Give your answer correct to 3 significant figures.
You must show your working.

..... cm$^2$

**(Total for Question 19 is 5 marks)**

**20** Martin did this question.

| |
|---|
| Rationalise the denominator of $\dfrac{14}{2+\sqrt{3}}$ |

Here is how he answered the question.

$$\frac{14}{2+\sqrt{3}} = \frac{14\times(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})}$$

$$= \frac{28-14\sqrt{3}}{4+2\sqrt{3}-2\sqrt{3}+3}$$

$$= \frac{28-14\sqrt{3}}{7}$$

$$= 4-2\sqrt{3}$$

Martin's answer is wrong.

(a) Find Martin's mistake.

.....

.....

**(1)**

Sian did this question.

| |
|---|
| Rationalise the denominator of $\dfrac{5}{\sqrt{12}}$ |

Here is how she answered the question.

$$\frac{5}{\sqrt{12}} = \frac{5\sqrt{12}}{\sqrt{12}\times\sqrt{12}}$$

$$= \frac{5\times 3\sqrt{2}}{12}$$

$$= \frac{5\sqrt{2}}{4}$$

Sian's answer is wrong.

(b) Find Sian's mistake.

.....

.....

**(1)**

**(Total for Question 20 is 2 marks)**

**21** Jackson is trying to find the density, in g/cm$^3$, of a block of wood.
The block of wood is in the shape of a cuboid.

He measures

the length as 13.2 cm, correct to the nearest mm
the width as 16.0 cm, correct to the nearest mm
the height as 21.7 cm, correct to the nearest mm

He measures the mass as 1970 g, correct to the nearest 5 g.

By considering bounds, work out the density of the wood.
Give your answer to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

**(Total for Question 21 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**