Name …….

MATHEMATICS

4th Year November Assessment 2018

Alpha Sets

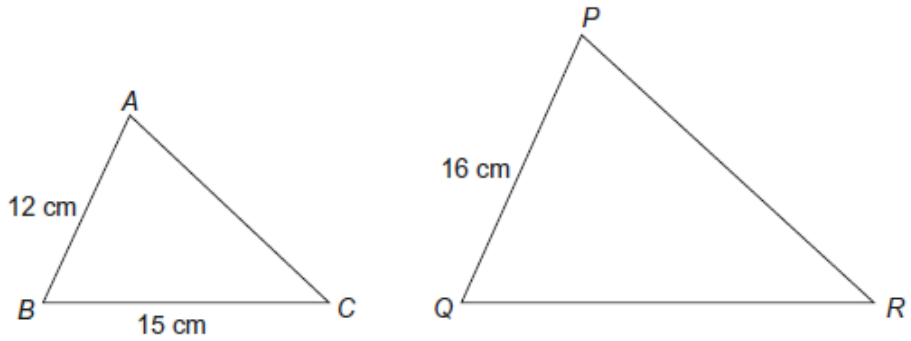
1 Hour

60 Marks

Calculators are allowed

1) Triangles *ABC* and *PQR* are similar.

Not drawn accurately



Work out the length *QR*.

(Total 2 marks)

2) (a) Factorise $n^2 + 7n + 6$

(2)

(b) Hence, or otherwise, write 176 as the product of its prime factors.
Give your answer in index form.

(3)

Factorise fully

(c) $6x^2 + 13x - 8$

(2)

(d) $18p^2 - 32q^2$

(2)

(Total 9 marks)

3) Use trial and improvement to find a solution to $2^x - 30 = 0$

Give your answer to 1 decimal place.

x	$2^x - 30$	Comment
4	– 14	Too small

x = _____

(Total 4 marks)

4) Solve the simultaneous equations

$$5x + 6y = 3$$

$$2x - 3y = 12$$

Do **not** use trial and improvement.

You **must** show your working.

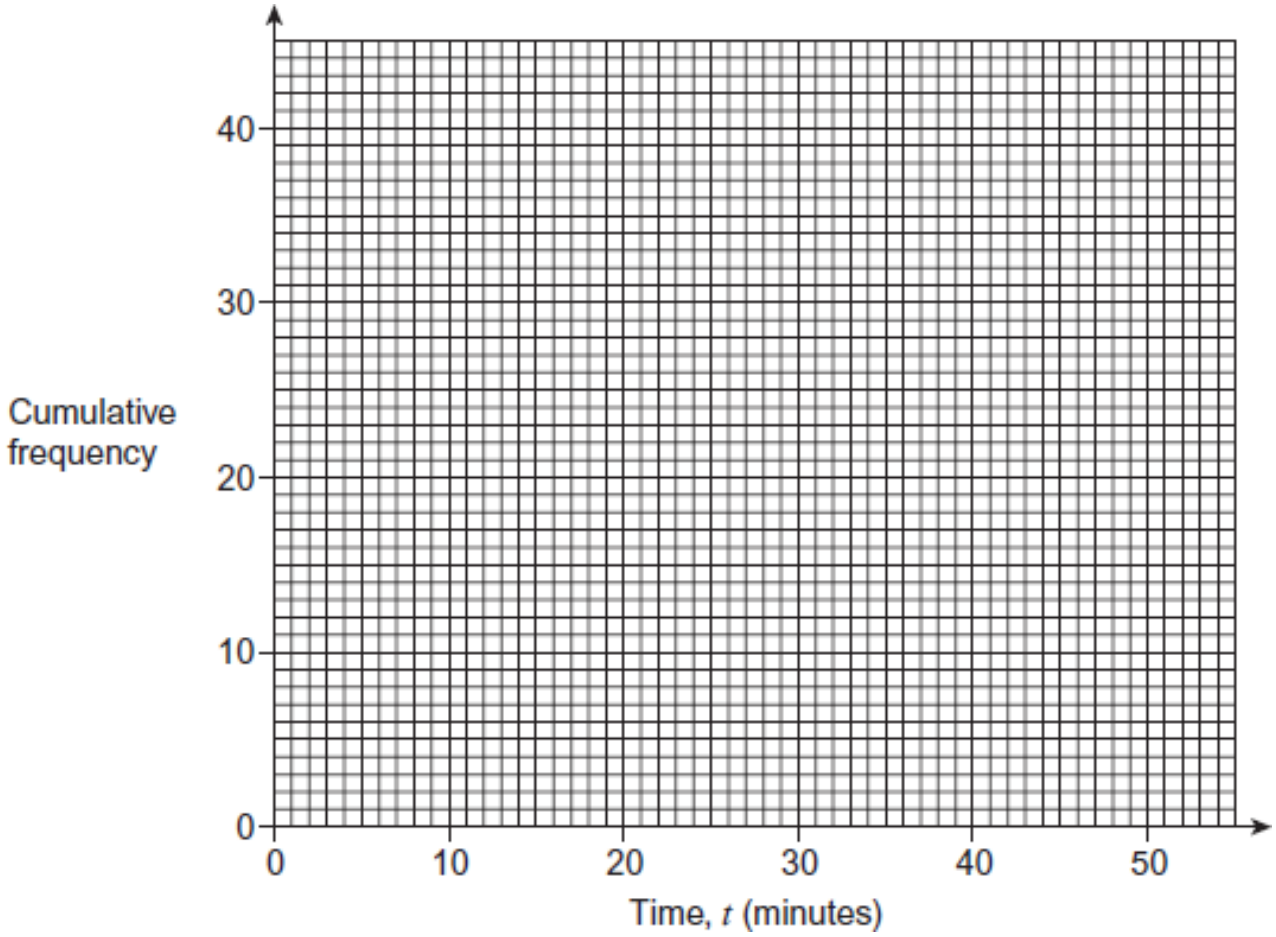
(Total 3 marks)

5) Dan and Jane take it in turns to drive to work.

The table shows information about 40 journeys when Dan drives.

Time, *t* (minutes)	**Frequency**
$10 \leq t < 20$	8
$20 \leq t < 25$	10
$25 \leq t < 30$	14
$30 \leq t < 45$	8

(a) Draw a cumulative frequency diagram to show this information on the grid.



(4)

(b) Use your graph to estimate the median journey time.

Answer _____ minutes

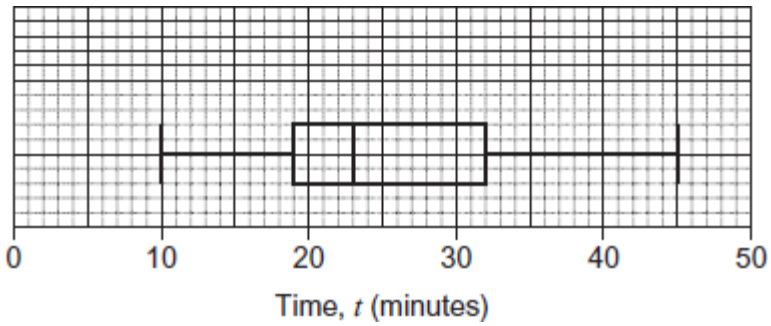
(1)

(c) Use your graph to estimate the interquartile range.

_____

Answer _____ minutes **(2)**

(d) The box-and-whisker plot shows information about 40 journeys when Jane drives.



Jane says,

"My times are quicker and more consistent than Dan's."

Comment on Jane's statement.

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 11 marks)

6) Solve the equation $5x^2 + 14x - 24 = 0$

_____

_____

_____

_____

_____

_____

_____

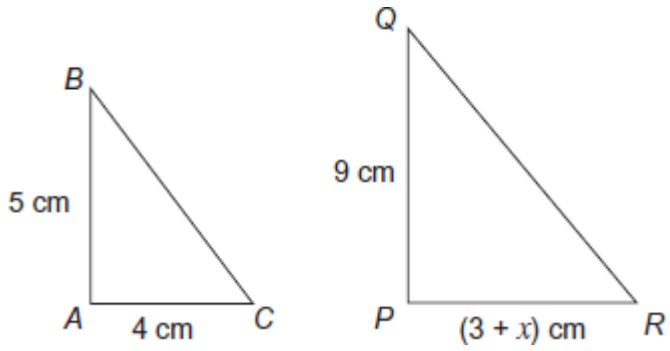
_____

Answer _____

(Total 3 marks)

7) *ABC* and *PQR* are similar triangles.

Not drawn accurately



(a) Which **one** of the following equations is correct for these triangles?
Circle your answer.

$\frac{3+x}{4}=\frac{5}{9}$ $\frac{3+x}{9}=\frac{5}{4}$ $\frac{3+x}{5}=\frac{9}{4}$ $\frac{3+x}{4}=\frac{9}{5}$

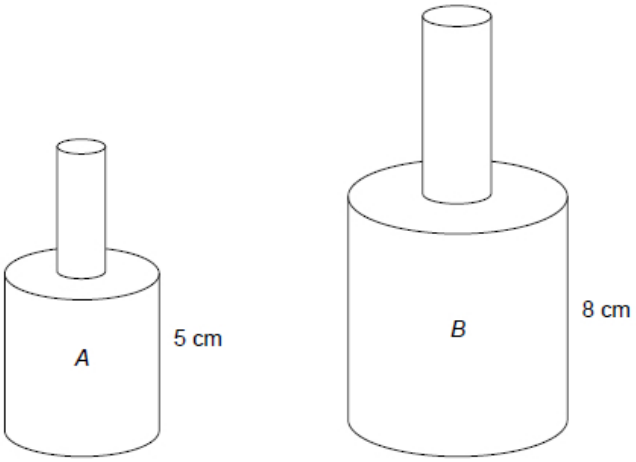
(1)

(b) Solve the equation you circled to work out the value of *x*.

(4)

(Total 5 marks)

8) Here are two similar solids, *A* and *B*.

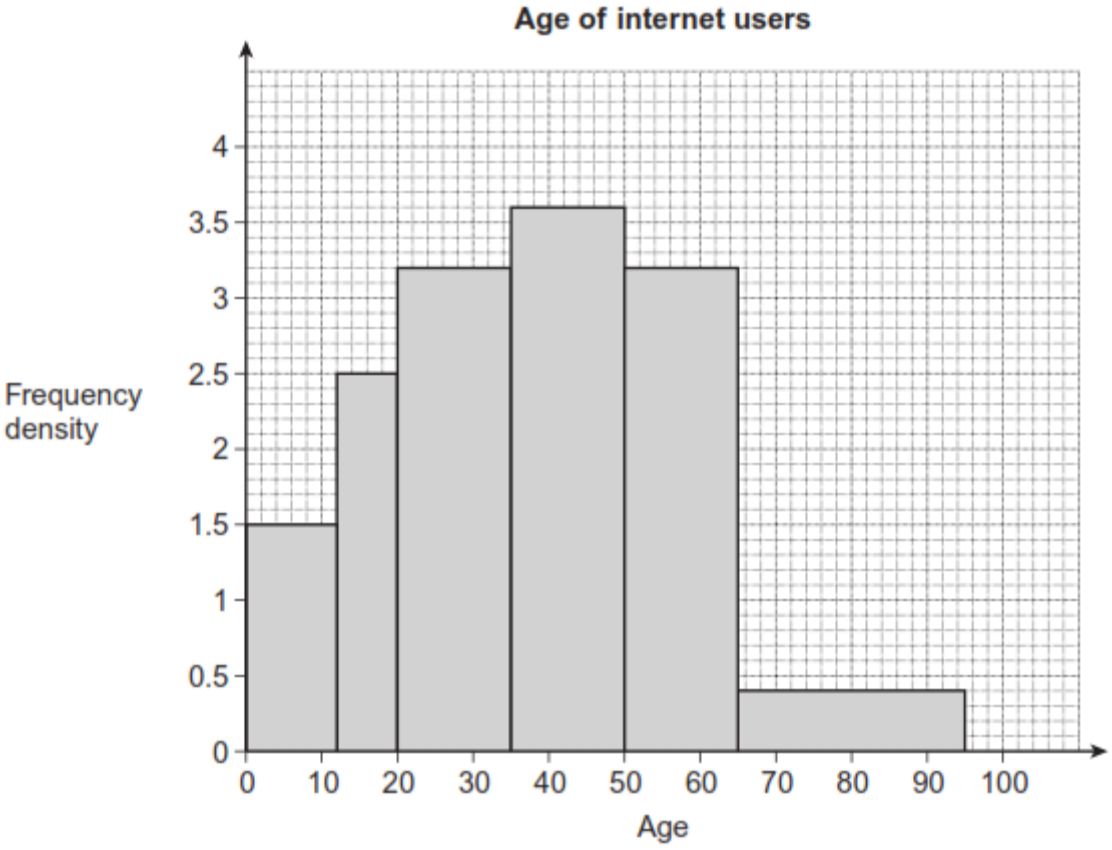


The volume of *B* is 400 cm^3

Is the volume of *A* approximately one quarter of the volume of B?
You **must** show your working.

(Total 4 marks)

9) (a) The histogram shows information about 200 internet users.



How many of these internet users are aged under 20?

(3)

(b) This question is about internet users in the UK.

In the last five years, the number has increased by 82%, correct to two significant figures.
There are now 30 million, to the nearest million.

Work out the maximum number of internet users five years ago.

(4)

(Total 7 marks)

10) Ella has these coins.

Jayden has these coins.

Ella takes one of her coins at random and gives it to Jayden.
Jayden adds it to his coins.

Then Jayden takes one of his coins at random and gives it to Ella.

What is the probability that Ella and Jayden now have the same amount of money as each other?
You **must** show your working.

(Total 4 marks)

11) The police want to know how many cars exceed the speed limit.
An officer stands with a speed gun and records the speeds of 1000 consecutive cars.

(a) Identify **one** possible source of bias for this experiment.

_____

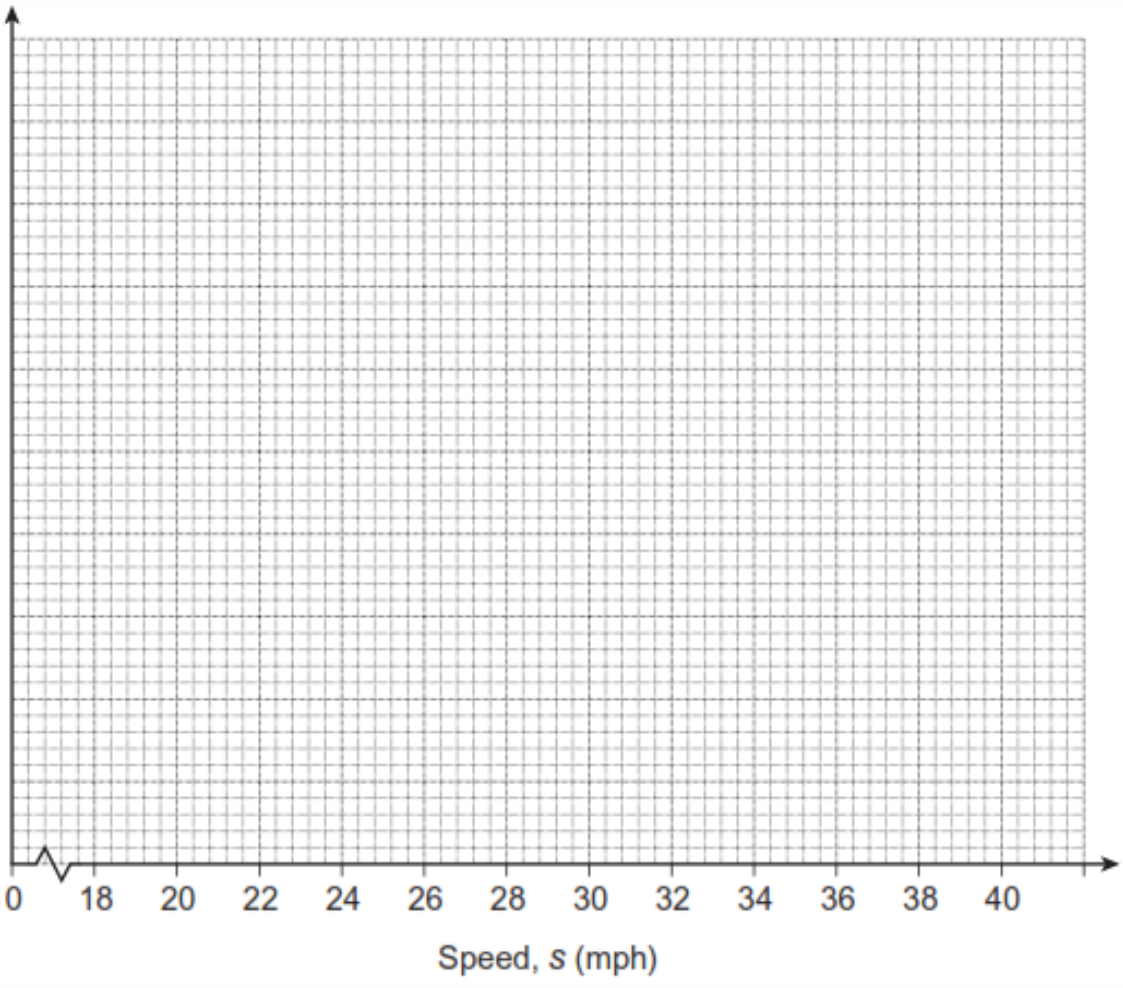
_____

(1)

(b) The grouped frequency table represents the speeds of the 1000 cars.

Speed, *s* (mph)	**Frequency**
$18 \leq s < 20$	80
$20 \leq s < 25$	440
$25 \leq s < 30$	360
$30 \leq s < 40$	120

On the grid below, show the data on a histogram.



(4)

(c) The speed limit for the road is 30 miles per hour.
Two cars are chosen at random from the 1000 cars.

Estimate the probability that **both** cars are at least 10% above the speed limit.

(3)
(Total 8 marks)

END OF EXAMINATION PAPER