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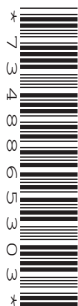
H

GCSE (9–1) Mathematics

J560/04 Paper 4 (Higher Tier)

Thursday 25 May 2017 – Morning

Time allowed: 1 hour 30 minutes



You may use:

- A scientific or graphical calculator
- Geometrical instruments
- Tracing paper



First name

Last name

Centre
number

Candidate
number

INSTRUCTIONS

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the barcodes.

INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- This document consists of **20** pages.

Answer **all** the questions.

1 Calculate.

(a) $\sqrt{\frac{4.8^2 + 3.6^2}{4}}$

(a) [2]

(b) $\frac{1}{(2 \times 10^4) + (5 \times 10^3)}$

(b) [2]

2 The length, L , of a steel rod is 8.3 m, correct to 1 decimal place.

Complete the error interval for length L .

..... $\leq L <$ [2]

- 3 (a) Write 504 as the product of its prime factors.

(a) [3]

- (b) Find the lowest common multiple (LCM) of 180 and 504.

(b) [2]

4

- 4 Find the value of s when $u = 12$, $a = 10$ and $t = 4$.

$$s = ut + \frac{1}{2}at^2$$

..... [2]

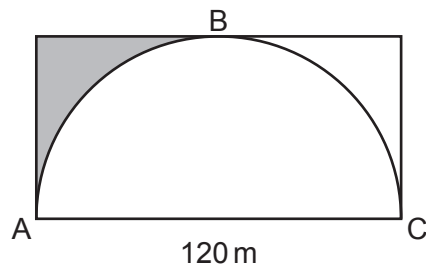
- 5 Mo's tyre pressure gauge shows a reading which is 12% higher than the actual pressure.

What is the actual pressure when Mo's gauge shows 38.64?

..... [3]

- 6 The diagram shows a semi-circle inside a rectangle of length 120 m.
The semi-circle touches the rectangle at A, B and C.

Not to scale



Calculate the **perimeter** of the shaded region.
Give your answer correct to 3 significant figures.

..... m [5]

6

7 A, B, C and D are four towns.

B is 25 kilometres due East of A.
C is 25 kilometres due North of A.
D is 45 kilometres due South of A.



Not to scale

C ×

A ×

×
B

D ×

(a) Work out the bearing of B from C.

(a)° [2]

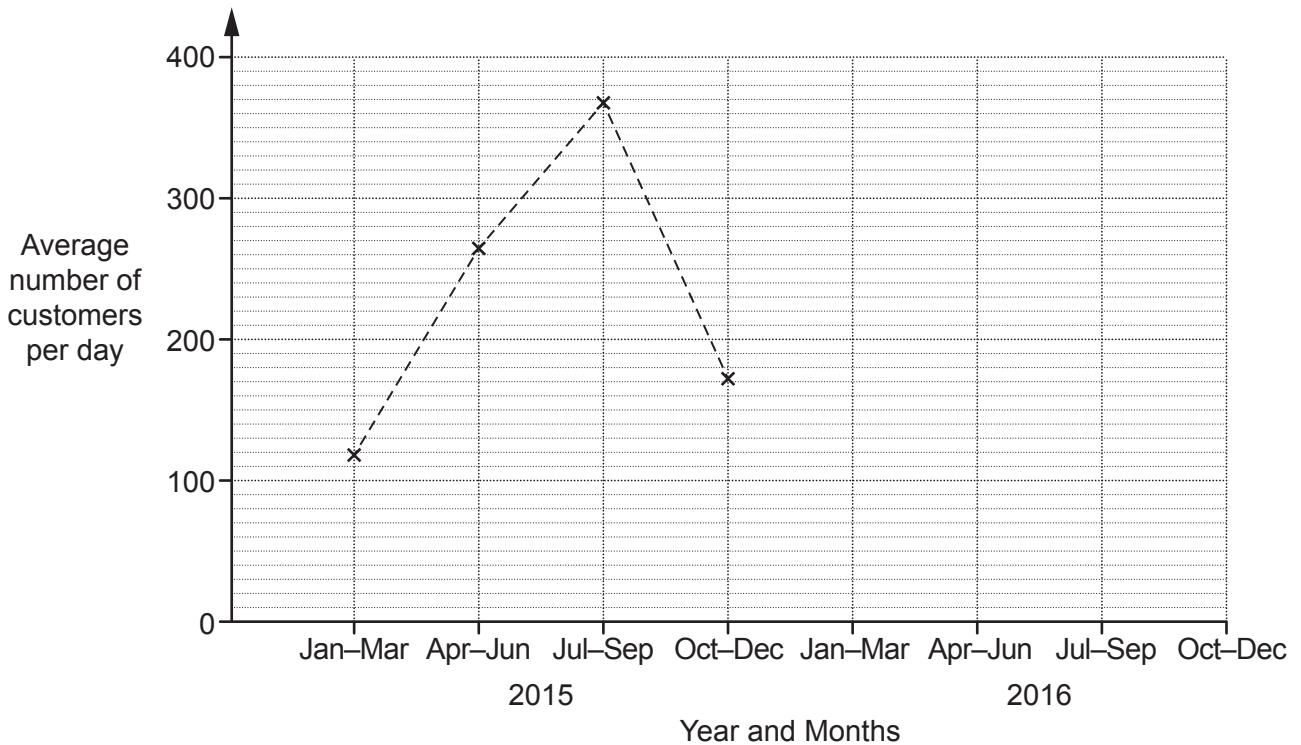
(b) Calculate the bearing of D from B.

(b)° [4]

- 8 The table shows the average number of customers per day entering a shop.

	2015				2016			
Months	Jan-Mar	Apr-Jun	July-Sep	Oct-Dec	Jan-Mar	Apr-Jun	July-Sep	Oct-Dec
Average number of customers per day	119	264	368	172	130	304	381	192

- (a) Complete the time series graph below.



[2]

- (b) Make two different comments comparing the number of customers entering the shop in 2015 and 2016.

Comment 1

.....

.....

Comment 2

.....

.....

[2]

- 9 Each week Dan drives two routes, route X and route Y.

One week he drives route X three times and route Y twice.
He drives a total of 134 miles that week.

Another week he drives route X twice and route Y five times.
He drives a total of 203 miles that week.

- (a) Find the length of each route.

(a) route X = miles

route Y = miles [5]

- (b) State an assumption that has been made in answering part (a).

.....

..... [1]

- 10** On 1st November 2015 there were 4200 trees planted in a wood.
On 1st November 2016, only 3948 of these trees were still alive.

It is assumed that the number of trees still alive is given by

$$N = ar^t$$

where N is the number of trees still alive t years after 1st November 2015.

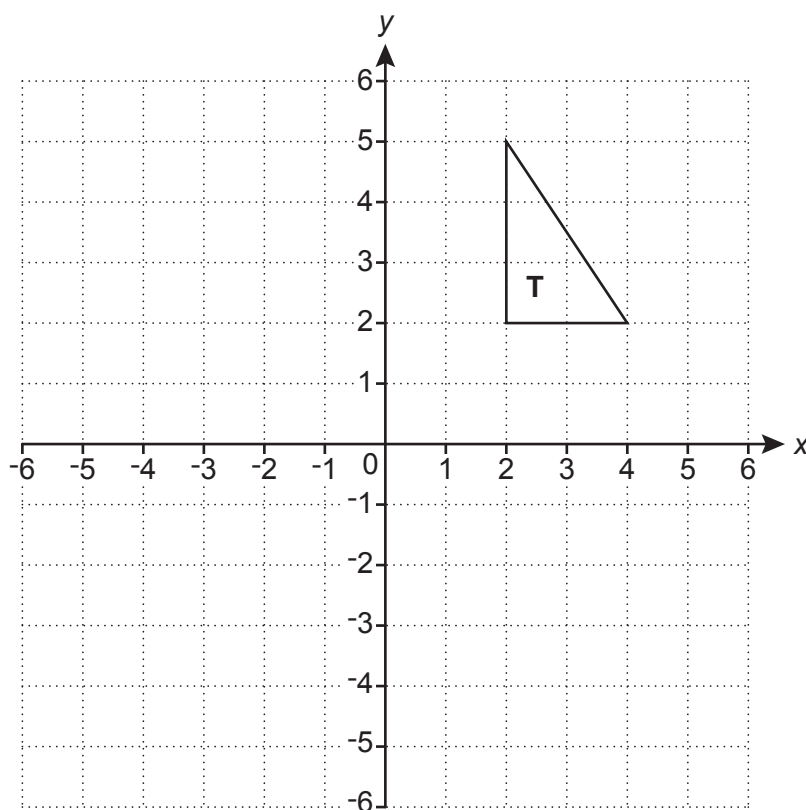
- (a)** Write down the value of a .

(a) [1]

- (b)** Show that r is 0.94. [2]

- (c)** Show that on 1st November 2030 the number of trees still alive is predicted to have decreased by over 60% compared with 1st November 2015. [3]

11 Triangle **T** is drawn on a coordinate grid.



(a) Translate triangle **T** using the vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$. [2]

(b) Describe fully the **single** transformation that represents the following.

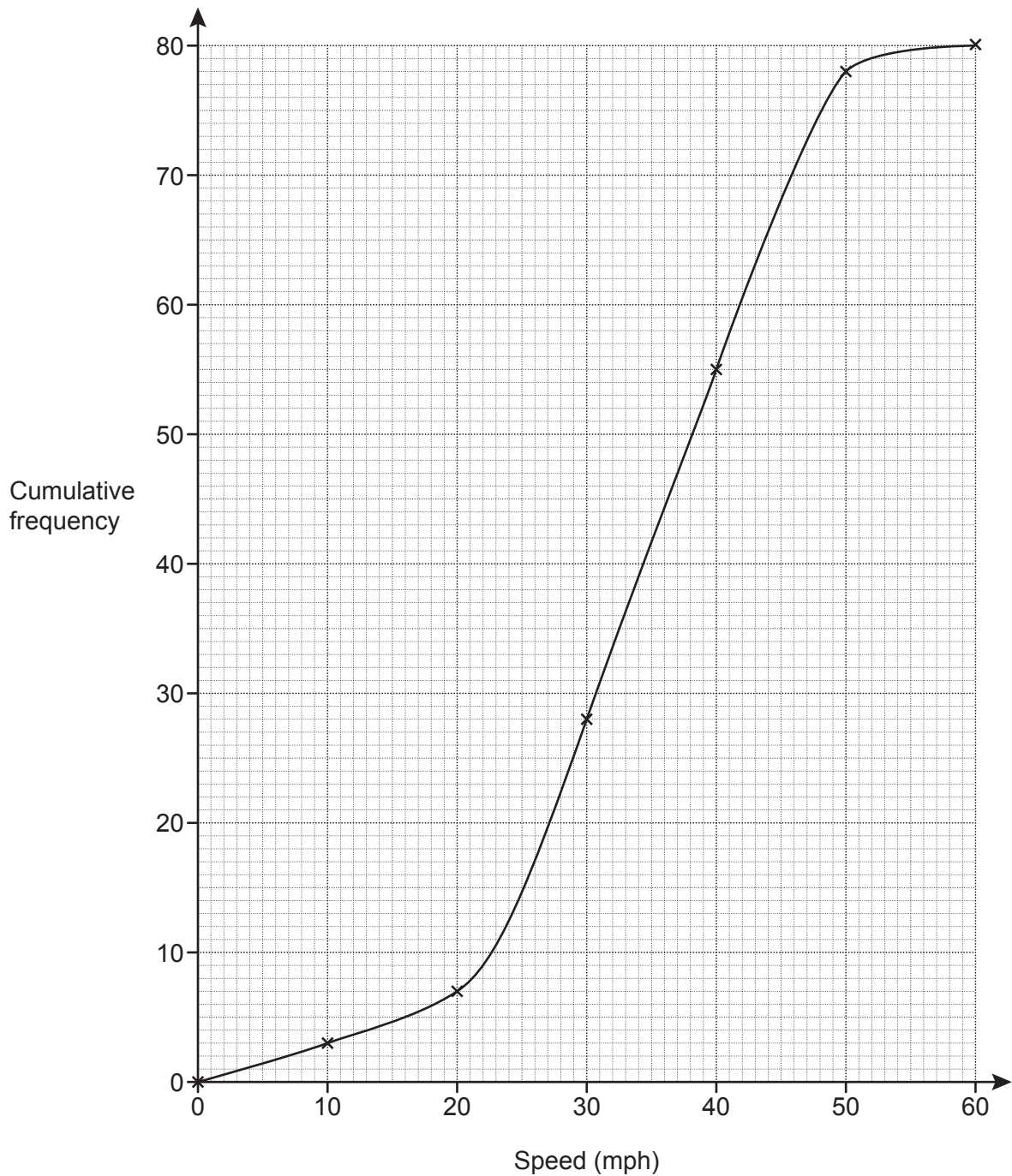
- (i) A rotation with centre (0, 0) of 180° followed by a rotation with centre (0, 0) of 90° clockwise.

.....
 [2]

- (ii) A reflection in the x -axis followed by a reflection in the y -axis.

.....
 [3]

- 12 The cumulative frequency graph shows the speeds, in miles per hour (mph), of vehicles passing a 40 mph speed limit sign on a road.

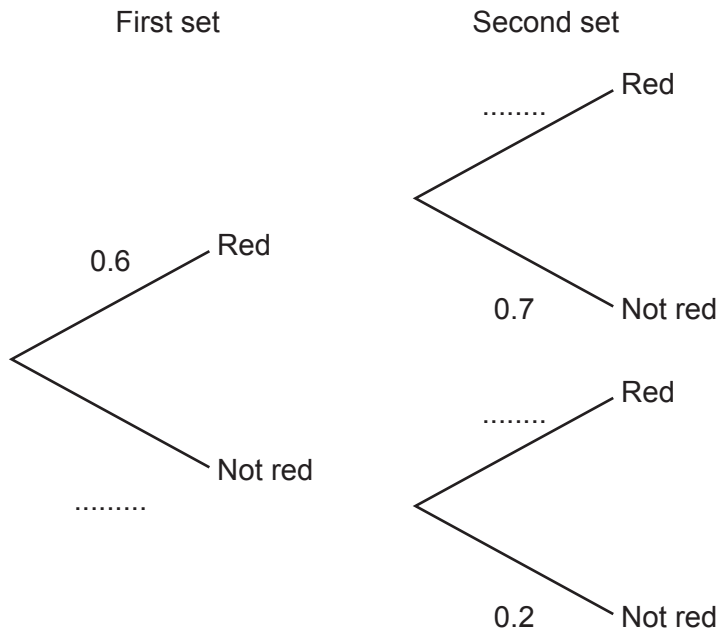


A speed camera will be installed if more than 30% of vehicles go over the speed limit of 40 mph.

Use information from the graph to decide if a speed camera should be installed.

[4]

- 13 Rashid drives his car along a road passing through two sets of traffic lights. The tree diagram shows the probabilities of the lights being **red** when he reaches them.



(a) Complete the tree diagram. [1]

(b) Write down the probability that the first set is **not red**.

(b) [1]

(c) Given that the first set is **red**, write down the probability that the second set is **not red**.

(c) [1]

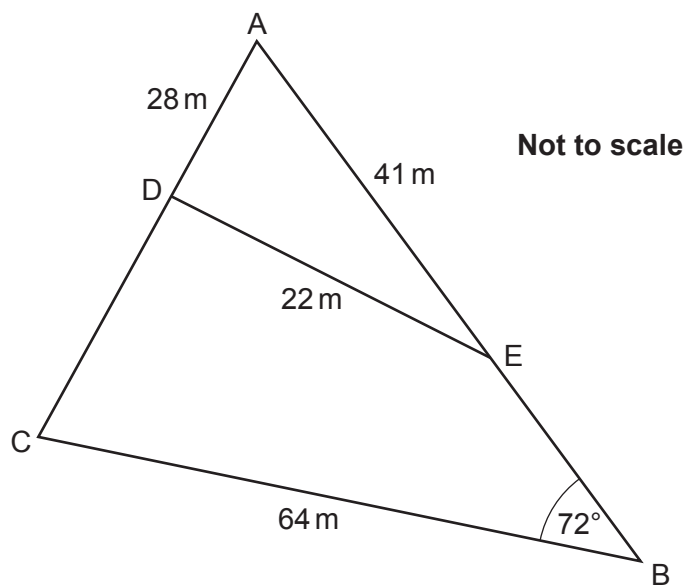
(d) Work out the probability that both sets are **not red**.

(d) [2]

(e) Work out the probability that at least one set is **not red**.

(e) [3]

- 14 The diagram shows triangle ABC with D on AC and E on AB. DE is a straight line.

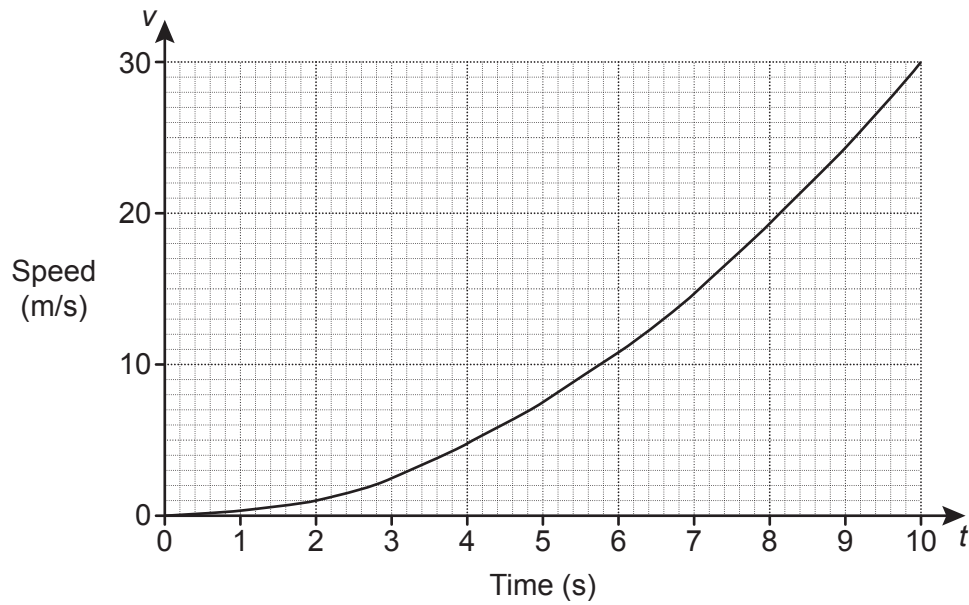


AD = 28 m, AE = 41 m, DE = 22 m and BC = 64 m.

Calculate the length CD.

..... m [6]

- 15 The graph shows the speed, v metres per second (m/s), of a car at time t seconds.



- (a) Find the speed of the car at $t = 7$.

(a) m/s [1]

- (b) It is claimed that the car has accelerated from 0 to 60 miles per hour in the first 10 seconds.

Does the graph support this claim? Show your reasoning.
Use 1 mile = 1.6 kilometres.

[5]

- (c) Use the graph to estimate the acceleration at $t = 7$.

(c) m/s^2 [3]

- (d) The speed of this car is directly proportional to the square of the time.

Find a formula linking v and t .

(d) [3]

- (e) Georgina says that the graph shows that the speed of the car will continue to increase after 10 seconds.

Make one comment to show that this statement is incorrect.

.....

 [1]

16 Write $x^2 - 10x + 16$ in the form $(x + a)^2 + b$.

..... **[3]**

17 Describe fully the graph which has the equation $x^2 + y^2 = 9$.

..... **[2]**

18 (a) Solve by factorisation.

$$2x^2 + 5x - 12 = 0$$

(a) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

(b) Solve this equation.
Give each value correct to 2 decimal places.

$$3x^2 + 2x - 3 = 0$$

(b) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

- 19 (a) Here are the first four terms of a sequence.

$$\frac{1}{2} \quad \frac{4}{3} \quad \frac{9}{4} \quad \frac{16}{5}$$

Find the n th term of this sequence.

(a) [2]

- (b) Here are the first four terms of a quadratic sequence, the n th term of this quadratic sequence is $an^2 + bn + c$.

$$2 \quad 12 \quad 28 \quad 50$$

Find the values of a , b and c .

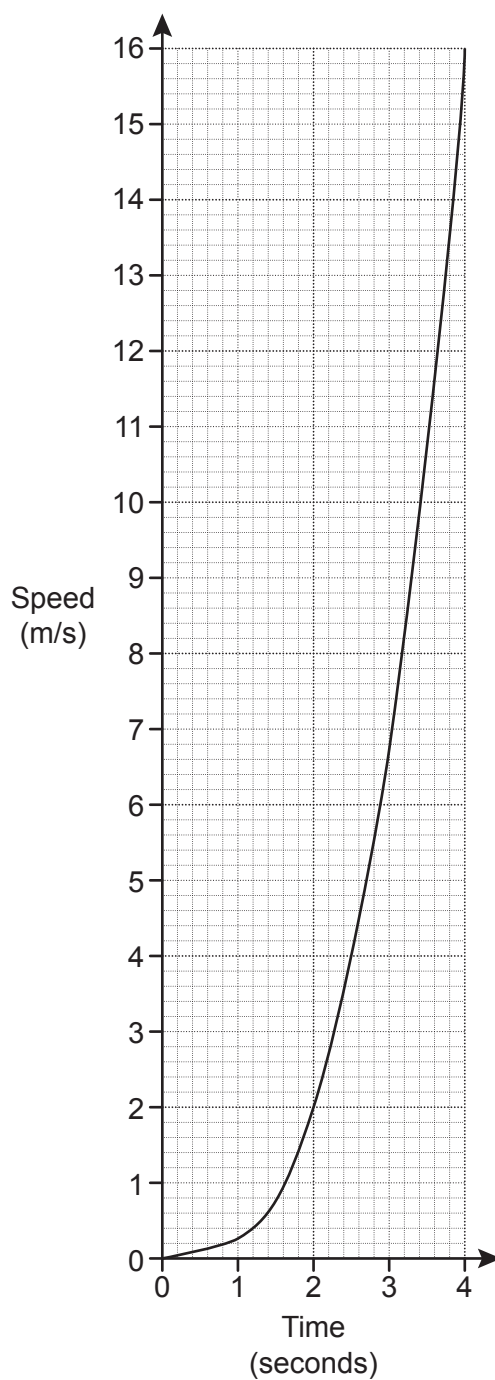
(b) $a =$

$b =$

$c =$

[4]

- 20 The graph shows the speed, in metres per second, of a particle over the first four seconds of motion.



Use the graph to estimate the distance travelled by the particle in the four seconds.

..... metres [2]

END OF QUESTION PAPER

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