OCR
Oxford Cambridge and RSA

H

Tuesday 21 May 2019 – Morning

GCSE (9–1) Mathematics

J560/04 Paper 4 (Higher Tier)

Time allowed: 1 hour 30 minutes

You may use:
- a scientific or graphical calculator
- geometrical instruments
- tracing paper

7736213689

J560/04

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- 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).

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 **16** pages.

Answer **all** the questions.

1 Calculate.

$$\sqrt[3]{\frac{210}{10^2 + 5^2}}$$

Give your answer correct to 3 significant figures.

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

2 The ratio 50 grams to 1 kilogram can be written in the form 1 : n.

Find the value of n.

$n =$ ..... **[2]**

3 **(a)** Anne, Barry and Colin share a prize in the ratio 3 : 4 : 5.
Colin gives $\frac{1}{3}$ of his share to a charity.

What fraction of the whole prize does Colin give to the charity?

(a) ..... **[3]**

(b) Delia, Edwin and Freya share some money in the ratio 5 : 7 : 8.
Freya's share is £1600.

How much money did they share?

(b) £ ..... **[2]**

4 A bus timetable shows the following information.

- A bus following route T leaves for the train station every 20 minutes.
- A bus following route A leaves for the airport every 18 minutes.
- A bus following route T and a bus following route A both leave at 8.37 am.

(a) When is the next time one of each bus is timetabled to leave at the same time?

(a) ..... **[4]**

(b) Write down one assumption that was necessary to solve this problem.

.....

..... **[1]**

5 Bennie is 7 years older than Ayesha.
Chloe is twice as old as Bennie.
The sum of their three ages is 57.

Work out the ages of Ayesha, Bennie and Chloe.

Ayesha's age is .....

Bennie's age is .....

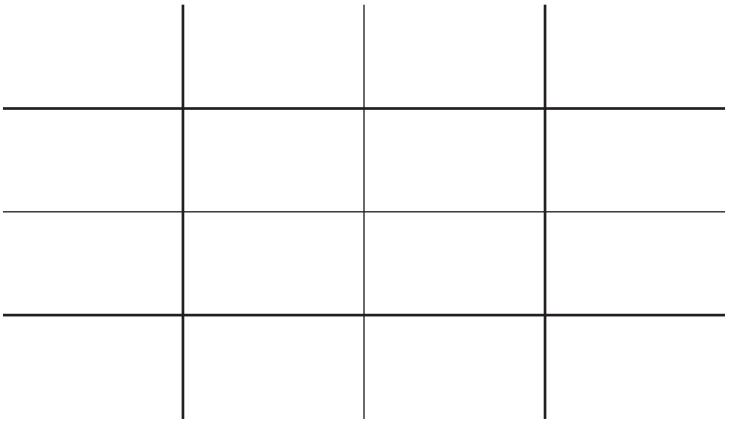
Chloe's age is ..... **[6]**

6 120 students in Year 10 and Year 11 sit a test.

- 61 of the students are in Year 10.
- 83 of the students are right-handed.
- 20 of the students in Year 11 are left-handed.

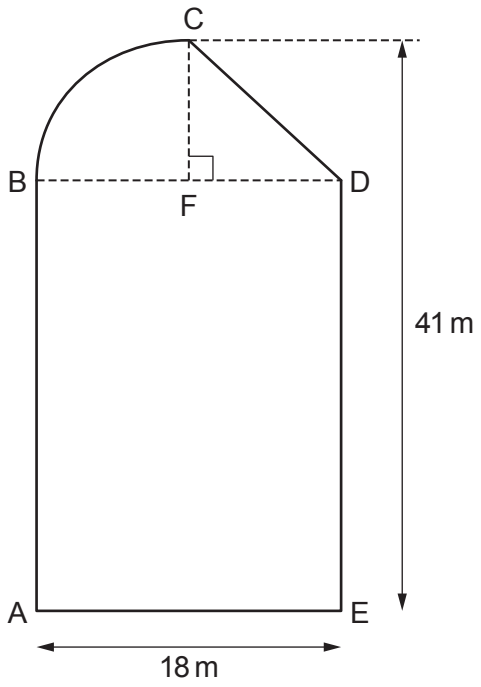
One of the students in Year 10 and one of the students in Year 11 are chosen at random.

Which one is more likely to be left-handed?
Show your working. You may use the table if you wish.



..... **[6]**

7 The diagram shows a shape ABCDE.
The shape is made from a rectangle, a right-angled triangle and a quarter of a circle.



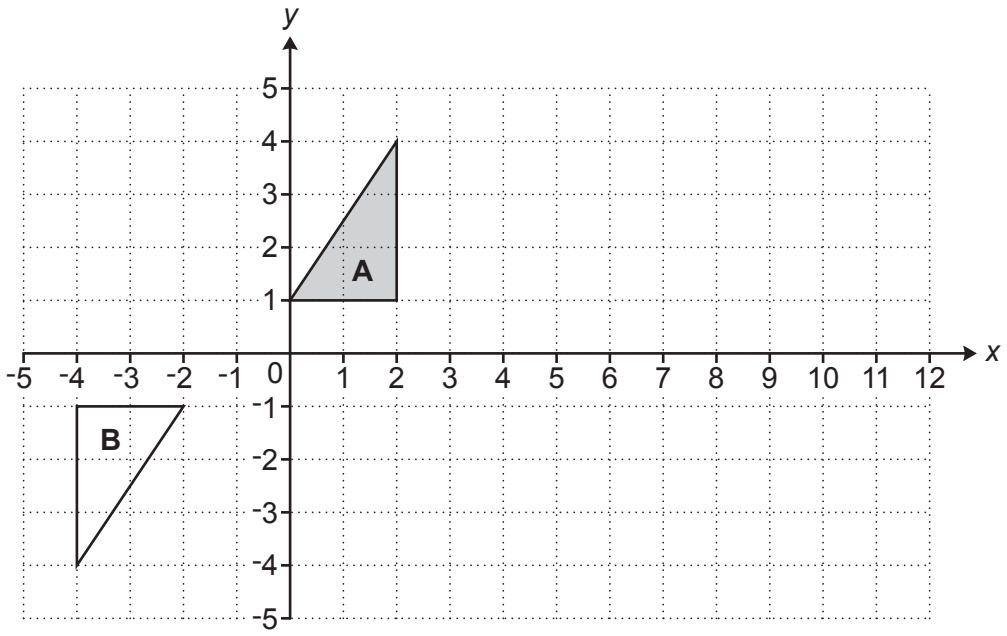
Not to scale

F is the mid-point of BD.
AE = 18 m and the perpendicular distance from C to AE is 41 m.

Work out the **perimeter** of the shape ABCDE.

..... m **[6]**

8 Triangle **A** and triangle **B** are drawn on the coordinate grid.



(a) Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

.....

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

(b) Describe fully the **single** transformation that is equivalent to:

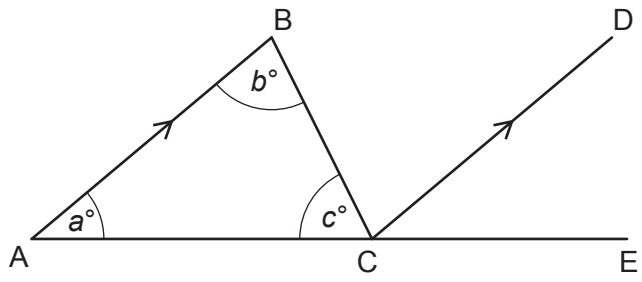
- a reflection in the line $x = 3$, followed by
- a translation by $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$.

You may use the grid above to help you.

.....

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

9 The diagram shows triangle ABC.
CD is parallel to AB.
A, C and E lie in a straight line.
Angles of size $a°$, $b°$ and $c°$ are shown.



Not to scale

(a) Insert $a°$, $b°$ or $c°$ to make this statement true.
Give a reason for your answer.

Angle DCE = ... because .....

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

(b) Use the diagram and the answer to part **(a)** to show that the angles of a triangle add up to 180°.
Give a reason for each statement you make. **[3]**

10 Claudia invests £25 000 at a rate of 2% per year compound interest.

Calculate the total amount of **interest** she will have earned after 5 years.
Give your answer correct to the nearest penny.

£ ..... **[4]**

11 The area of a rectangle is 56 m^2, correct to the nearest m^2.
The length of the rectangle is 9.2 m, correct to the nearest 0.1 m.

Calculate the smallest possible width of the rectangle.

..... m **[4]**

12 **(a)** Here are the first four terms of a sequence.

-1 4 9 14

Write an expression for the nth term of this sequence.

(a) ..... **[2]**

(b) The nth term of another sequence is given by

$$an^2 + bn$$

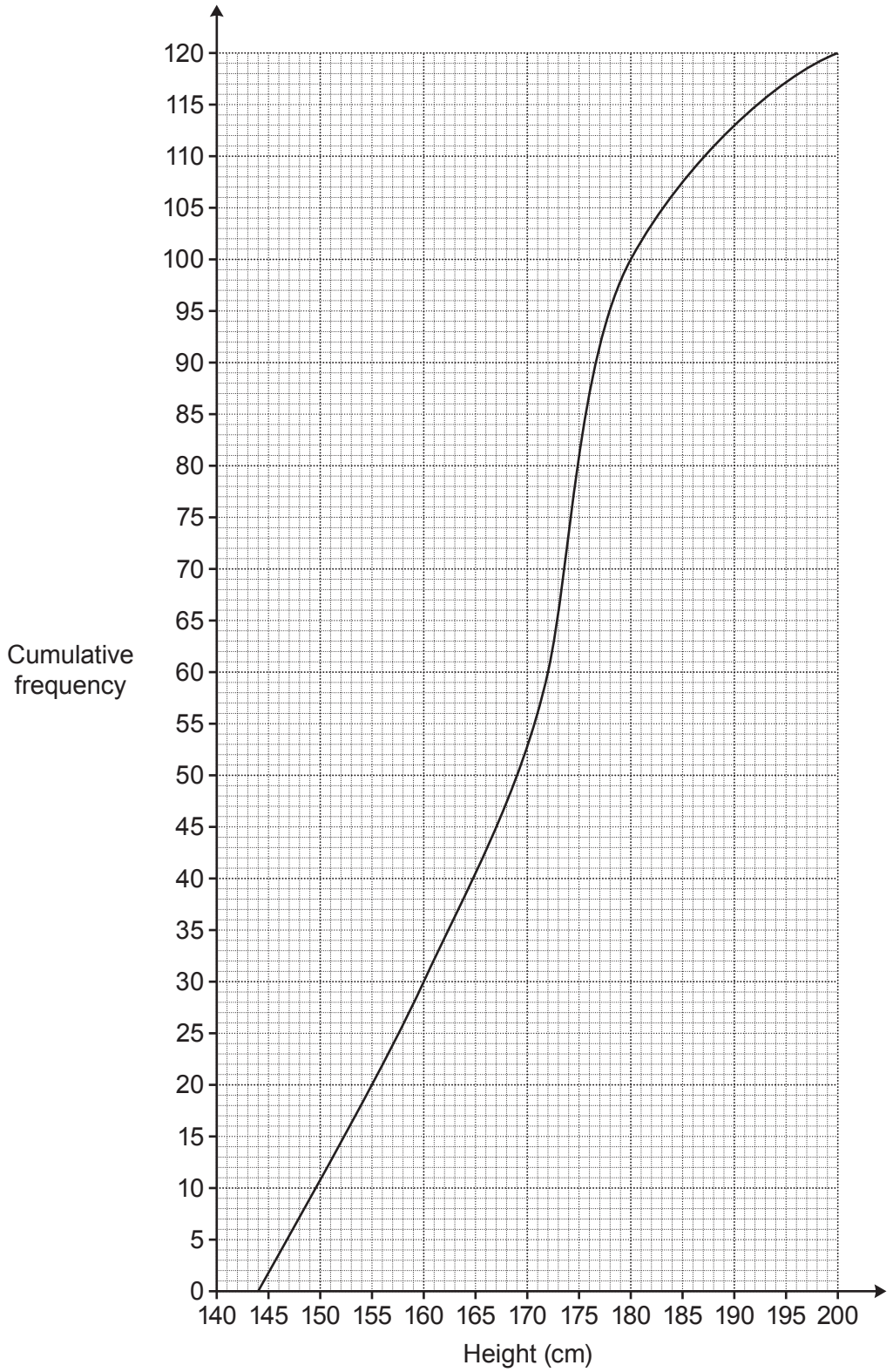
The third term is 9 and the sixth term is 126.

Find the value of a and the value of b.

(b) $a =$ .....

$b =$ ..... **[5]**

13 **(a)** The cumulative frequency graph shows the distribution of the heights of members of a rowing club.



(i) Find the median.

(a)(i) ..... cm **[1]**

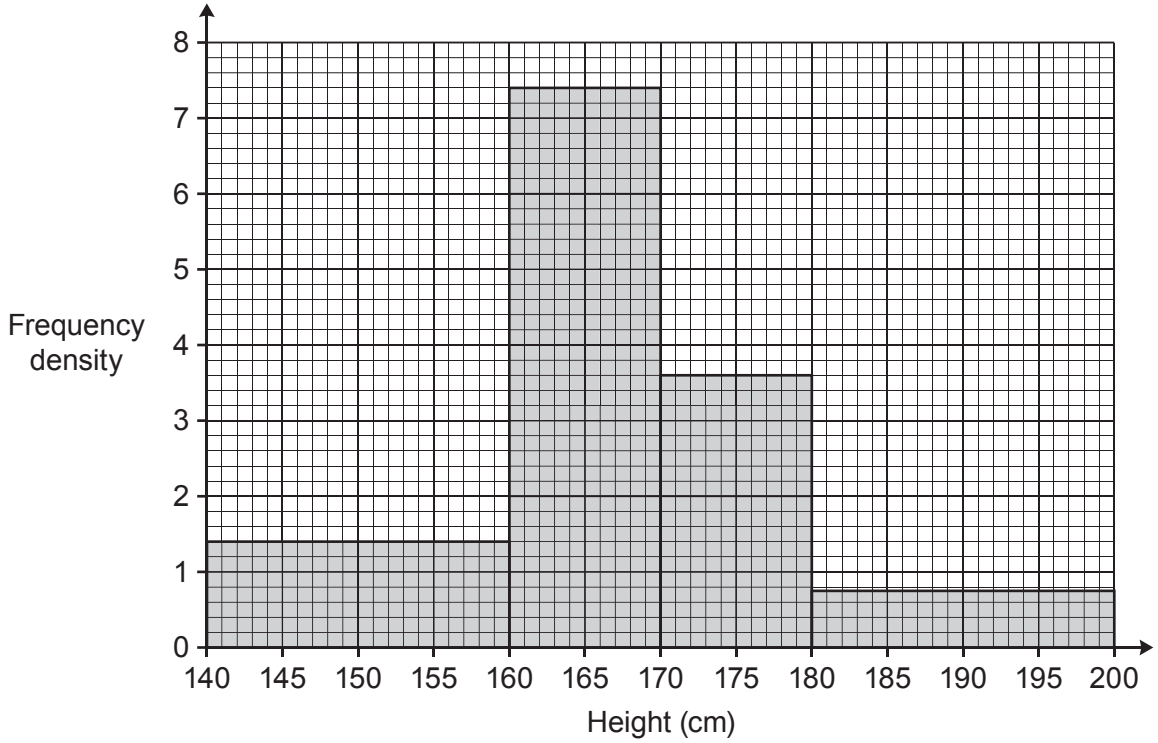
(ii) Find the interquartile range.

(ii) ..... cm **[2]**

(iii) Calculate the percentage of the members who are at least 180 cm tall.

(iii) ..... % **[3]**

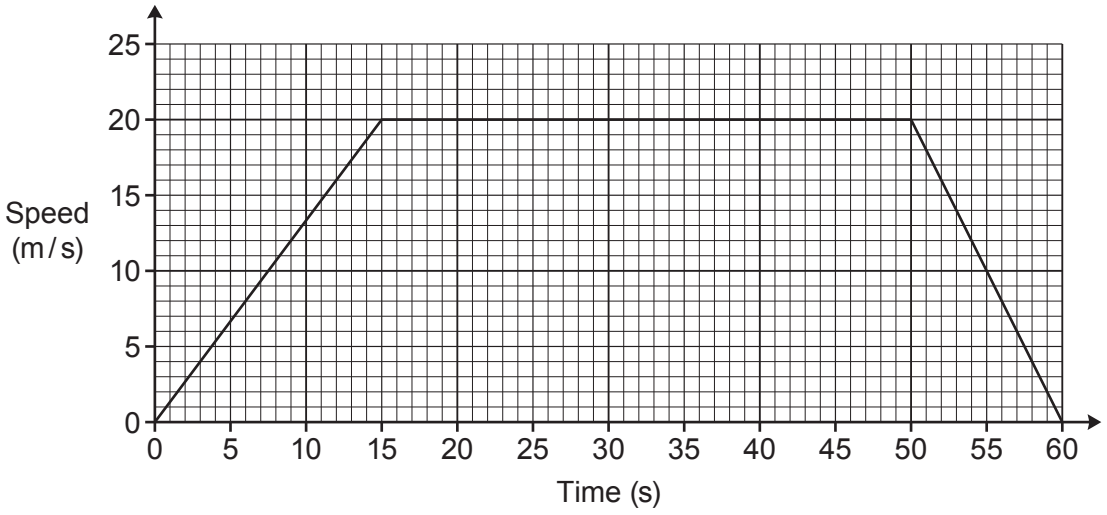
(b) The histogram summarises the heights of the 153 members of a swimming club.



Which club has the greater median height?
You must show all your working.

..... **[5]**

14 The graph shows the speed of a train during the first 60 seconds of motion.



(a) What is the speed of the train after 9 seconds?

(a) ..... m/s **[1]**

(b) What does the straight line suggest about the speed of the train over the first 15 seconds?

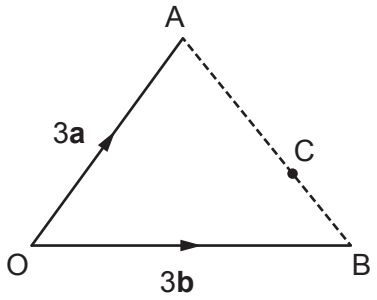
.....

..... **[1]**

(c) Work out the average speed of the train, in m/s, during the 60 seconds.

(c) ..... m/s **[5]**

15 The diagram shows triangle OAB and points C and D.



Not to scale

D

$\overrightarrow{OA} = 3\mathbf{a}$ and $\overrightarrow{OB} = 3\mathbf{b}$.
C lies on AB such that $AC = 2CB$.
D is such that $\overrightarrow{BD} = 2\mathbf{a} + \mathbf{b}$.

Show, using vectors, that OCD is a straight line. **[5]**

16 **(a)** The table shows values of x and y.

x	4	16	36
y	6	3	2

Show that these values fit the relationship that y is inversely proportional to $\sqrt{x}$. **[2]**

(b) a is inversely proportional to b^2 and $a = 3.75$ when $b = 4$.

Find a formula linking a and b.

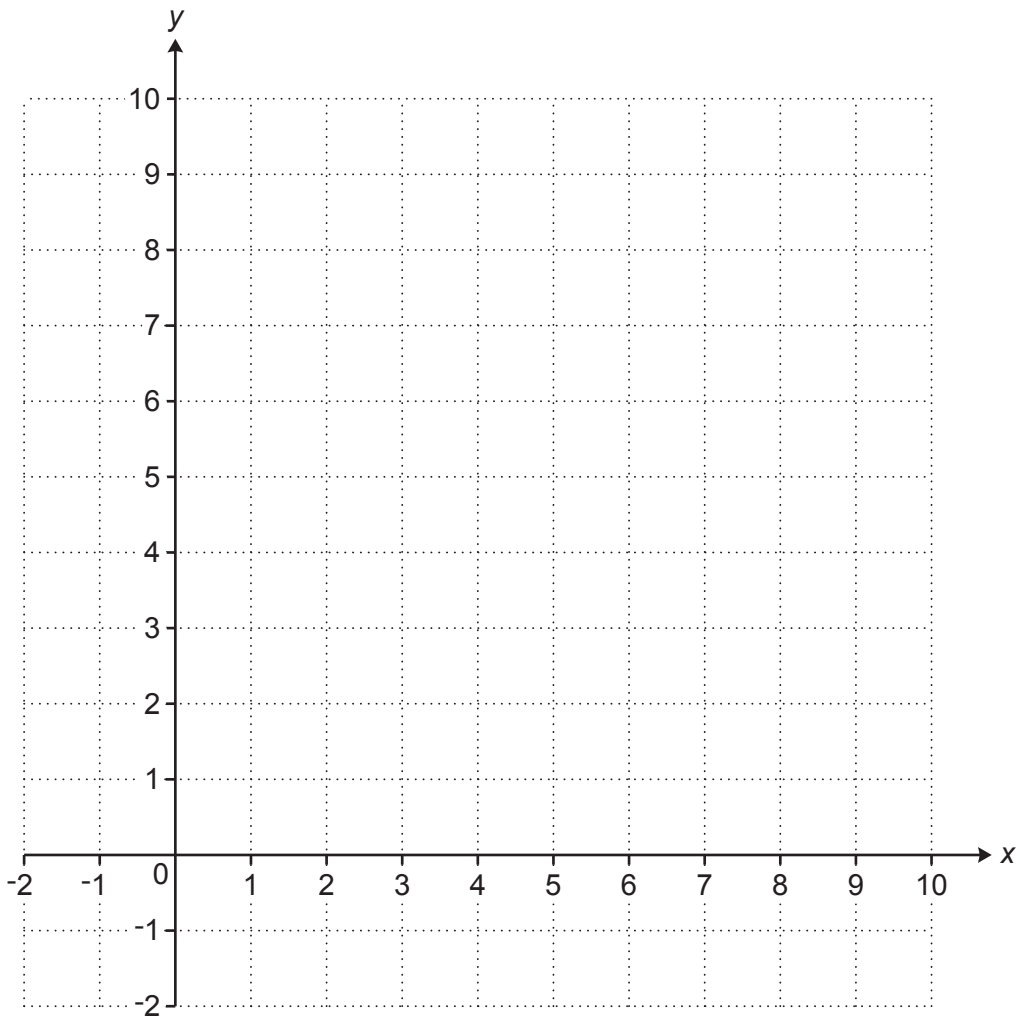
(b) ..... **[3]**

17 Show that $(a^3)^{-\frac{1}{3}} \times (a^2)^{\frac{1}{2}} = 1$. **[3]**

18 Region **R** satisfies these inequalities.

$y > 3$
$y \geqslant x$
$x + y \leqslant 9$

By drawing three straight lines on the grid, find and label the region **R**.



[6]

Turn over for Question 19

19 Solve this equation algebraically.
Give your solutions correct to 2 decimal places.

$$3x^2 + 8x - 5 = 0$$

$x =$ ..... or $x =$ ..... **[4]**

END OF QUESTION PAPER