Mathematics
2019 Practice Paper
Paper 3 (Calculator)
Foundation Tier

Time: 1 hour 30 minutes

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – there may be more space than you need.
- **Calculators may be used**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – use this as a guide as to how much time to spend on each question.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

1 Write 6461 correct to the nearest hundred

_6500_

(Total for question 1 is 1 mark)

2 Work out $\frac{1}{7}$ of 84

$84 \div 7$

_12_

(Total for question 2 is 1 mark)

3 Work out 10% of £95

$95 \div 10 = 9.5$

£ _9.50_

(Total for question 3 is 1 mark)

4 One night the temperature in Paris was −6°C.
The temperature in Moscow was 4°C less than the temperature in Paris.

What was the temperature at Moscow?

$-6 - 4$

_−10_ °C

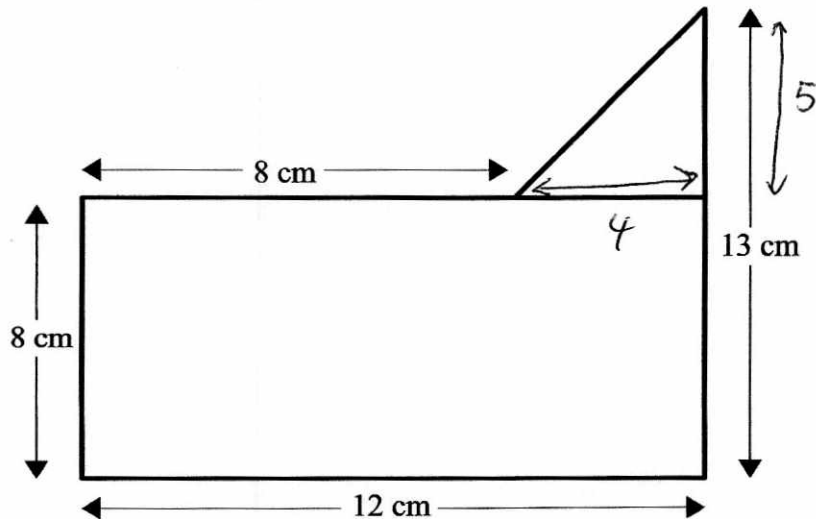**(Total for question 4 is 1 mark)**

5 Change 3.5 metres into centimetres

3.5×100

_350_ centimetres

(Total for question 5 is 1 mark)

6 A shape is made from a triangle and a rectangle.

8 cm

8 cm

12 cm

13 cm

5

4

Work out the total area of the shape.

$$\text{Rectangle Area} = 12 \times 8 = 96 \text{ cm}^2$$
$$\text{Triangle Area} = \frac{4 \times 5}{2} = 10 \text{ cm}^2$$
$$96 + 10 = 106$$

.........106.........cm²

(Total for question 6 is 3 marks)

7 Poppy wants to buy as many chocolate bars as she can.

She has £5 to spend on chocolate bars.   500p

Each chocolate bar costs 42p

Work out how much change Poppy will get from £5.
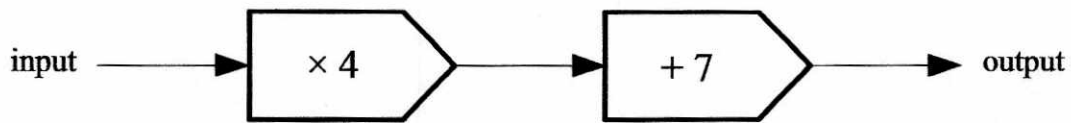
$$\frac{500}{42} = 11.904\ldots$$

11 chocolate bars : $11 \times 42 = 462p$

$$500 - 462 = 38$$

.........38p.........

(Total for question 7 is 3 marks)

8 Here is a number machine.

input $\longrightarrow$ ×4 $\longrightarrow$ +7 $\longrightarrow$ output

(a) Find the output when the input is 5

$$5 \times 4 + 7$$

.....**27**.....
(1)

(b) Find the output when the input is –3

$$-3 \times 4 + 7$$

.....**– 5**.....
(1)

(c) Find the <u>input</u> when the <u>output</u> is 71

$$71 - 7 = 64$$
$$64 \div 4 = 16$$

.....**16**.....
(2)

(Total for question 8 is 4 marks)

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9 (a) Write the ratio 15 : 35 in its simplest form.

÷5   ÷5

.....**3 : 7**.....
(1)

(b) There are red shapes and blue shapes in a box, $\frac{2}{3}$ of the shapes are red.

Write the ratio of red shapes to blue shapes.

$$\frac{2}{3} : \frac{1}{3}$$

.....**2 : 1**.....
(1)

(Total for question 9 is 2 marks)

10 Which is greater

25% of 90 or 28% of 82

You must show your working.

$$0.25 \times 90 = 22.5$$

$$0.28 \times 82 = 22.96$$

28% of 82

(Total for question 10 is 3 marks)

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11 Here are three cards. Each card has a number on it.

| 7 | 2 | 8 |

Write down all the possible three digit numbers that can be made using these three cards.

728, 782, 278, 287, 872, 827

(Total for question 11 is 2 marks)

12 Amy, Harry and Emily all save part of their salary each month.

Amy saves $\frac{2}{15}$ of her salary

The amount Harry saves to the amount he spends is in the ratio 1:6 $\quad \frac{1}{7}$

Emily **spends** 86% of her salary.

(a) Show that Harry saves the largest proportion of his salary.

Amy saves $\frac{2}{15} \times 100$ = ~~40%~~ 13.3%

Harry saves $\frac{1}{7} \times 100$ = 14.2857%

Emily saves 14%

(b) Lily says:

"This means Harry saves the most money each month"

Give a reason to say whether Lily is or is not correct.

we do not know how much money any of them save only the proportion of their salary.
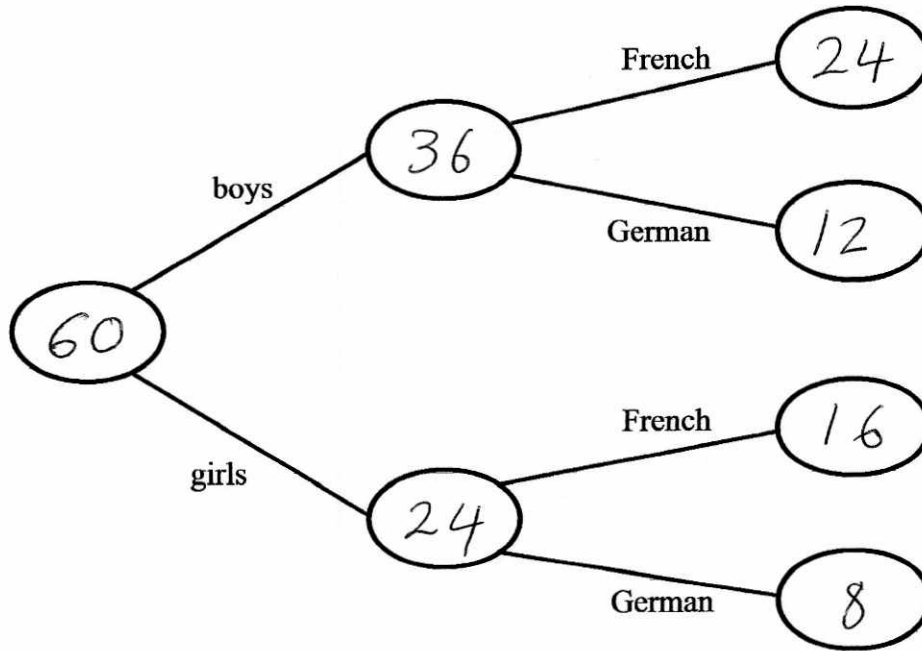
(Total for question 12 is 3 marks)

13 60 students study a language at a school.
Each student either studies French or German.

36 of the students are boys.

$\frac{2}{3}$ of the boys study French

40 students study French

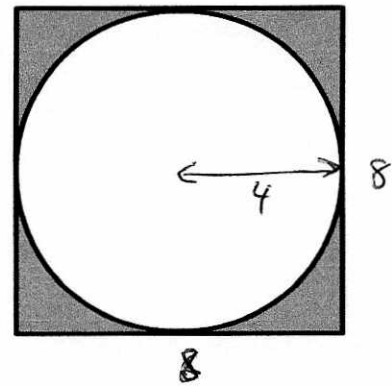Use this information to complete the frequency tree.

14 A circle is enclosed by a square as shown in the diagram.

Each side of the square measures 8cm.

Find the area of the shaded region.

Give your answer correct to 1 decimal place.

Area of Square $= 8 \times 8 = 64$cm^2

Area of circle $= \pi(4)^2$

$\qquad\qquad = 16\pi = 50.265...$

$64 - 16\pi = 13.7$ (1dp)

...........................13.7...........................cm^2

(Total for question 14 is 3 marks)

15 (a) Make n the subject of $m = n^2 + 3$

$m - 3 = n^2$

$\sqrt{m-3} = n$

$n = \sqrt{m-3}$

(2)

(b) Simplify $5m^2 \times 3m^4$

$15m^6$

(1)

(c) Expand and simplify $(x+3)(x-5)$
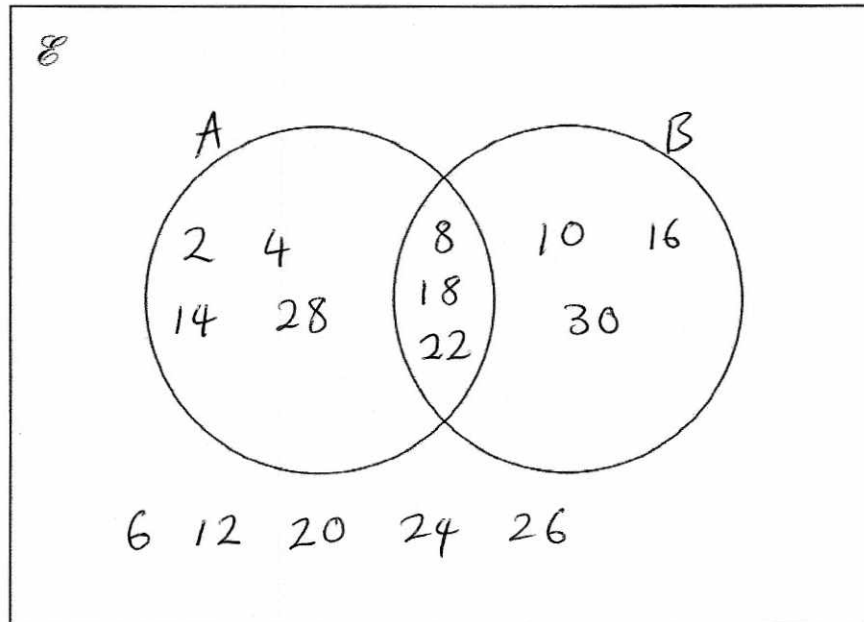
$x^2 - 5x + 3x - 15$

$x^2 - 2x - 15$

(2)

(Total for question 15 is 5 marks)

16 $\mathscr{E}$ = {even numbers between 1 and 31}
A = {2, 4, 8, 14, 18, 22, 28}
B = {8, 10, 16, 18, 22, 30}

(a) Complete the Venn diagram to represent this information.

(4)

A number is chosen at random from the universal set, $\mathscr{E}$

(b) What is the probability that the number is in the set $A \cup B$?

$$\frac{10}{15} \quad \left[\text{OR} \quad \frac{2}{3} \right]$$

(2)

(Total for question 16 is 6 marks)

17 The frequency table shows the time taken for 100 people to travel to an event.

Time (minutes)	Frequency
$0 < t \leqslant 10$	14
$10 < t \leqslant 20$	16
$20 < t \leqslant 30$	23
$30 < t \leqslant 40$	29
$40 < t \leqslant 50$	12
$50 < t \leqslant 60$	6

(a) Find the percentage of people that travelled for more than 30 minutes to the event

$$29 + 12 + 6$$

........47........%

(2)

(1)

(b) Draw a frequency polygon for the information on the table.

Frequency

Time (*t* minutes)
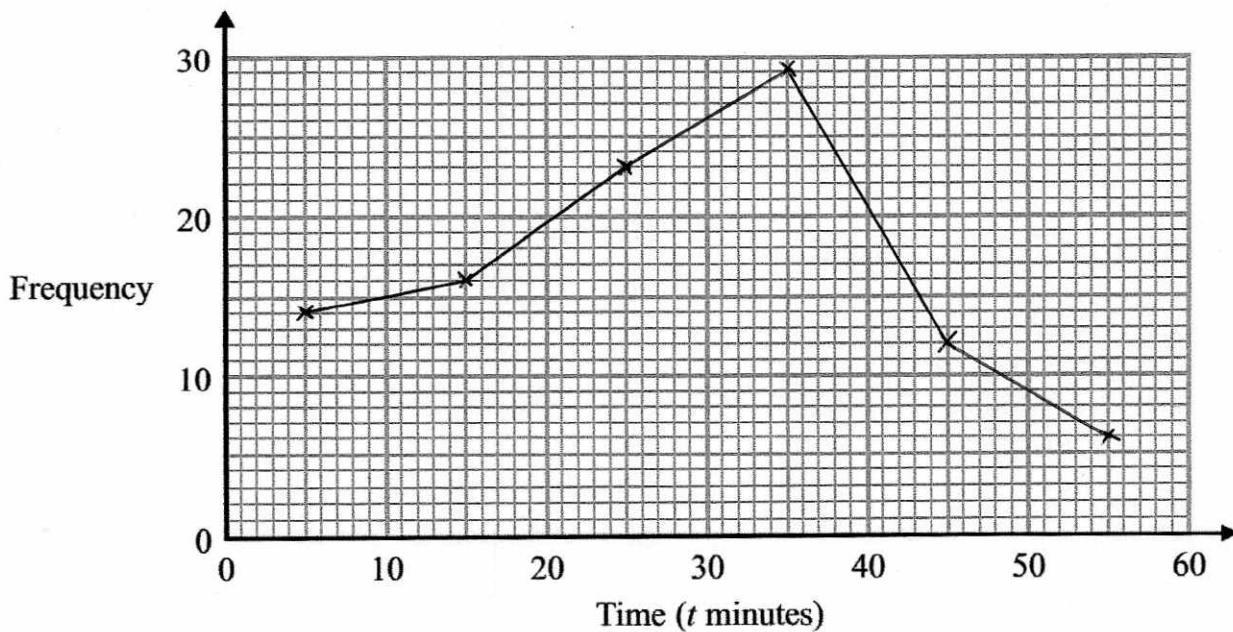
(2)

3

(Total for question 17 is 4 marks)

18 (a) Find the reciprocal of 8

$$\frac{1}{8}$$

(1)

(b) Use your calculator to work out $(2 \cos 40° + 3 \sin 25°)^3$
Write down all the figures on your calculator display.

$$21.95067518$$

(2)

(Total for question 18 is 3 marks)

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19 Solve the simultaneous equations

$$2x + 5y = 2 \qquad \times 7$$
$$7x - 4y = -1 \qquad \times 2$$

$$14x + 35y = 14$$
$$14x - 8y = -2$$

$$43y = 16$$
$$y = \frac{16}{43}$$

$$2x + 5\left(\frac{16}{43}\right) = 2$$

$$2x + \frac{80}{43} = 2$$

$$2x = \frac{6}{43}$$

$$x = \frac{3}{43}$$

$x =$ ....$\dfrac{3}{43}$............

$y =$ ....$\dfrac{16}{43}$............

(Total for question 19 is 3 marks)

20 A is the point with coordinates (3, 8)
B is the point with coordinates (x, 13)

$x_1 \ y_1$

$x_2 \ y_2$

The gradient of AB is 2.5
Work out the value of x

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$2.5 = \frac{13 - 8}{x - 3}$$

$$2.5 = \frac{5}{x - 3}$$

$$x - 3 = \frac{5}{2.5}$$

$$x - 3 = 2$$

$$x = 5$$

$x = 5$

(Total for question 20 is 2 marks)

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21 (a) Olivia is going to invest some money for 5 years.

She can choose from two options:

Investment A: 2.7% compound interest per annum

Investment B: 2.8% simple interest per annum

Which investment should Olivia choose
You must show your working.

A/

$$100 \times 1.027^5$$

$$= 114.248$$

$$+ 14.25\%$$

B/

$$2.8 \times 5 = 14$$

$$100 \times 1.14 = 114$$

$$+ 14\%$$

Investment   A

(Total for question 21 is 4 marks)

22 The exchange rate in London is £1 = $1.31

The exchange rate in New York is $1 = £0.79

Bernie wants to change some pounds into dollars.

In which of these cities would Bernie get the most dollars?
You must show your working.

London : £1 = $1.31

New York $1 = £0.79

$\div 0.79$ $\div 0.79$

$1.27 = £1

London

3

23 Each year Rose buys an annual ticket for his train journey to work.

The price of Rose's ticket increased by 2% in 2017 and 3% in 2018.

The ticket cost £2534 in 2018.

What was the price of the ticket in 2016?

$$2534 = 103\%$$
$$24.6 = 1\%$$
$$2460.19 = 100\% \ [2017]$$

$$2460.19 = 102\%$$
$$\cancel{2460.19} = 1\%$$
$$24.12$$
$$2411.96 = 100\% \ [2016]$$

£ ....2411.96........

(Total for question 23 is 3 marks)

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24 Last year Patrick paid £2534 for his annual train ticket.
This year he has to pay £2612 for his annual train ticket.

Work out the percentage increase in the cost of his train ticket.
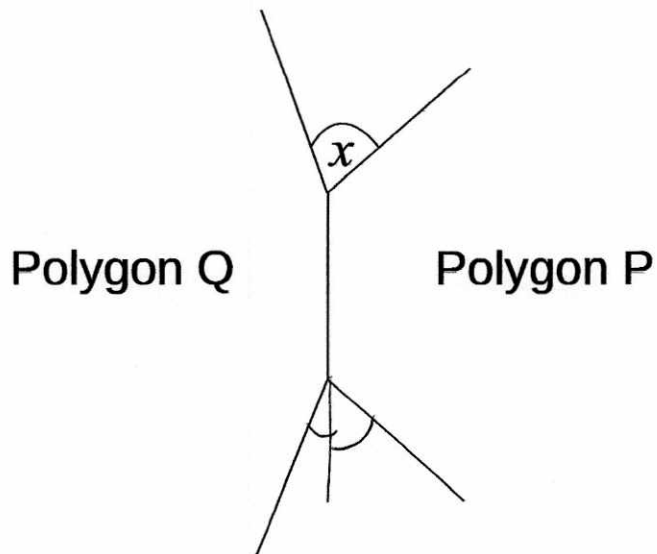Give your answer to 3 significant figures.

$$\frac{change}{original} \times 100$$

$$\frac{2612 - 2534}{2534} \times 100 = 3.078137332\%$$

........3.08........%

(Total for question 24 is 3 marks)

25 Two regular polygons P and Q have a common side as shown in the diagram.

Polygon Q   Polygon P

Polygon P has n sides. Polygon Q has twice as many sides as Polygon P.

$2n$

Find the size of angle x in terms of n.

Exterior Angle of P = $\dfrac{360}{n}$

Exterior Angle of Q = $\dfrac{360}{2n}$

$x = \dfrac{360}{n} + \dfrac{360}{2n}$

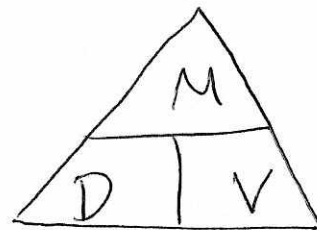$= \dfrac{360}{n} + \dfrac{180}{n}$

$= \dfrac{540}{n}$

$\dfrac{540}{n}$

....

(Total for question 25 is 3 marks)

26 Liquid **A** has a density of 1.2 g/cm³

150 cm³ of Liquid **A** is mixed with some of Liquid **B** to make Liquid **C**.

Liquid **C** has a mass of 210 g and a density of 1.12 g/cm³

Find the density of Liquid **B**.

~~Give your answer to 2 decimal places.~~

Liquid A : mass = density × volume

$$= 1.2 \times 150$$

$$= 180 \, g$$

Liquid C : volume = $\dfrac{mass}{density}$

$$= \dfrac{210}{1.12}$$

$$= 187.5 \, cm^3$$

Liquid B   Mass = 210 − 180 = 30 g

volume = 187.5 − 150

$$= 37.5$$

Density = $\dfrac{30}{37.5}$ = 0.8

..................0.8..................g/cm³
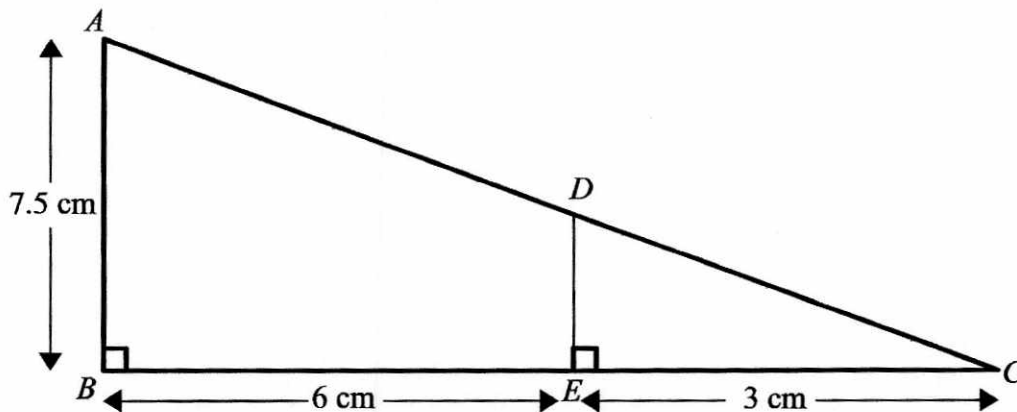
(Total for question 26 is 3 marks)

27 Solve $n^2 - 49 = 0$

$$(n + 7)(n - 7) = 0$$

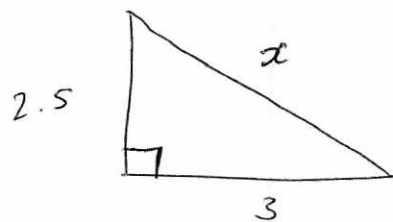$n = 7$ or $n = -7$

(Total for question 27 is 2 marks)

28

(a) Find the length of DE

$\div 3$

$7.5 \div 3$

D 7.5

E 3 C B 9 C

$\times 3$

2.5 ....cm
(2)
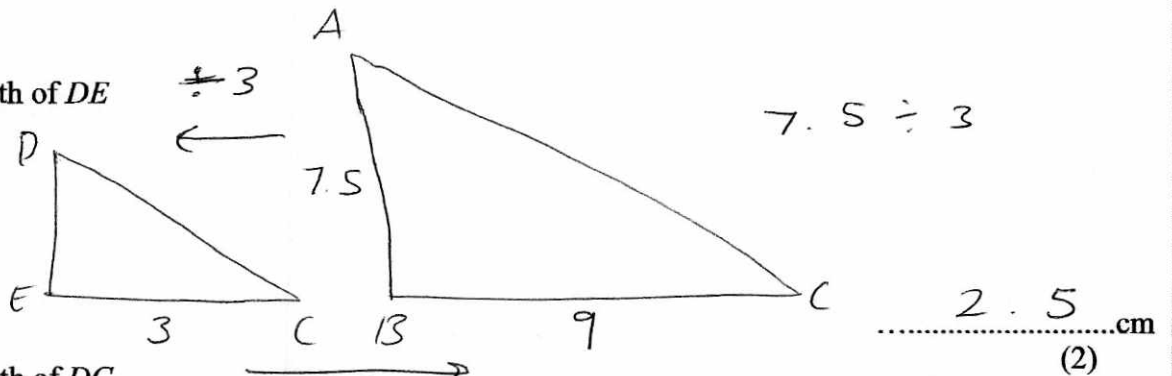
(b) Find the length of DC
Give your answer correct to 1 decimal place.

2.5

x

3

$x^2 = 2.5^2 + 3^2$

$x^2 = \frac{61}{4}$

$x = \sqrt{\frac{61}{4}}$

$= 3.9$

3.9 ....cm
(3)

(Total for question 28 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS