

Write your name here

Surname

Other Names

# 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  $-6^{\circ}\text{C}$ .  
The temperature in Moscow was  $4^{\circ}\text{C}$  less than the temperature in Paris.

What was the temperature at Moscow?

$$-6 - 4$$

..... $-10^{\circ}\text{C}$

(Total for question 4 is 1 mark)

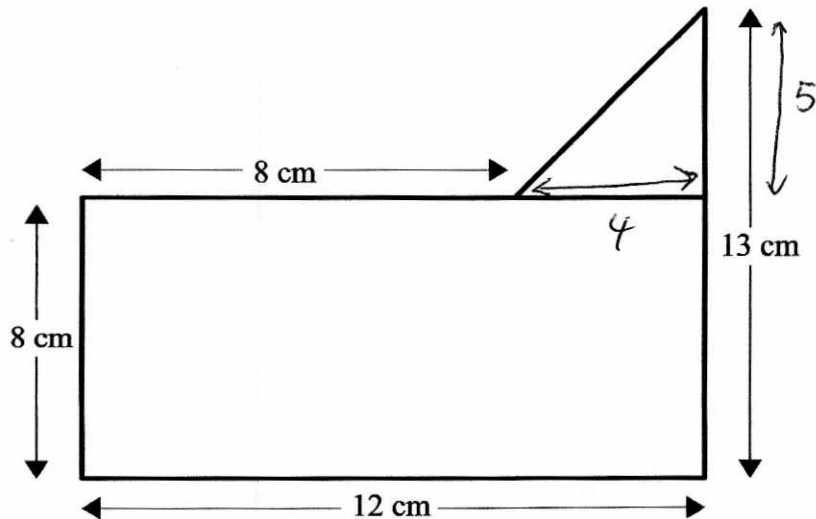
5 Change 3.5 metres into centimetres

$$3.5 \times 100$$

.....350.....centimetres

(Total for question 5 is 1 mark)

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



Work out the total area of the shape.

$$\begin{aligned} \text{Rectangle Area} &= 12 \times 8 = 96 \text{ cm}^2 \\ \text{Triangle Area} &= \frac{4 \times 5}{2} = 10 \text{ cm}^2 \end{aligned}$$

$$96 + 10 = 106 \quad \dots\dots\dots 106 \text{ cm}^2$$

(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.

$$\frac{500}{42} = 11.904\dots$$

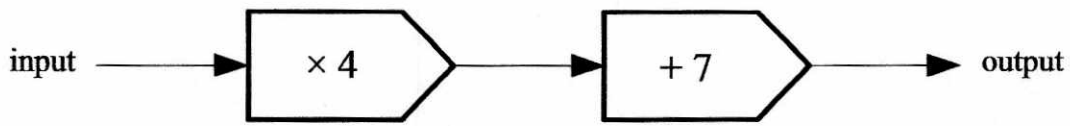
$$11 \text{ chocolate bars : } 11 \times 42 = 462 \text{ p}$$

$$500 - 462 = 38$$

$$\dots\dots\dots 38 \text{ p}$$

(Total for question 7 is 3 marks)

8 Here is a number machine.



(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 input when the output is 71

$$71 - 7 = 64$$

$$64 \div 4 = 16$$

16

(2)

(Total for question 8 is 4 marks)

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

$$\div 5 \quad \div 5$$

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)

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



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  $1:6 \frac{1}{7}$

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

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

$$\text{Amy saves } \frac{2}{15} \times 100 = \cancel{40\%} \quad 13.3\%$$

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

$$\text{Emily saves } 14\%$$

(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)

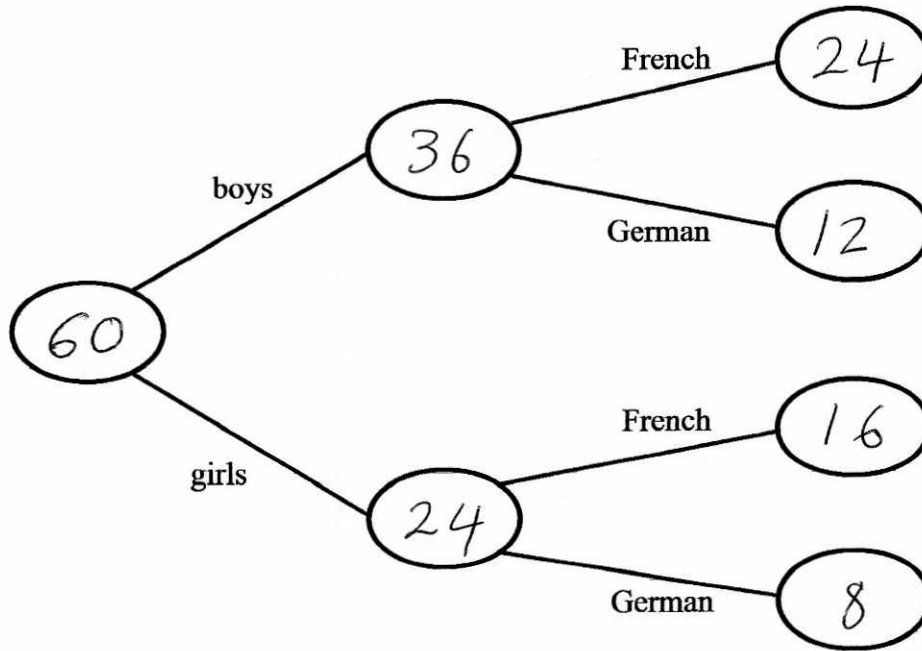
13 60 students study a language at a school.  
Each student either studies French or German.

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.



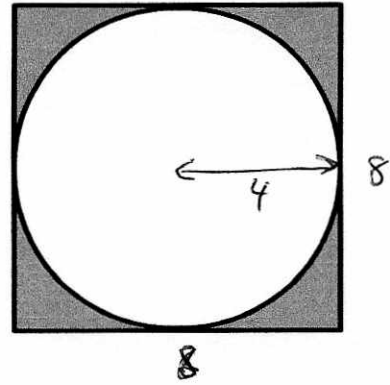
(Total for question 13 is 4 marks)

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.



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

$$\begin{aligned} \text{Area of circle} &= \pi (4)^2 \\ &= 16\pi = 50.265\dots \end{aligned}$$

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

$$\dots\dots\dots 13.7 \dots\dots\dots \text{cm}^2$$

(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)

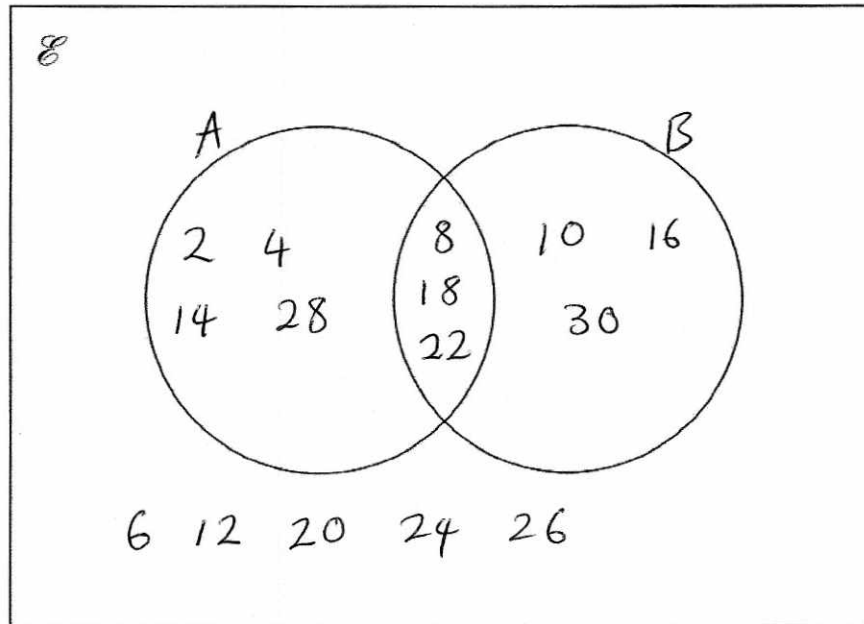


16  $\mathcal{E} = \{\text{even numbers between 1 and 31}\}$

$A = \{2, 4, 8, 14, 18, 22, 28\}$

$B = \{8, 10, 16, 18, 22, 30\}$

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



(4)

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

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

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

(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
$0 < t \leq 10$	14
$10 < t \leq 20$	16
$20 < t \leq 30$	23
$30 < t \leq 40$	29
$40 < t \leq 50$	12
$50 < t \leq 60$	6

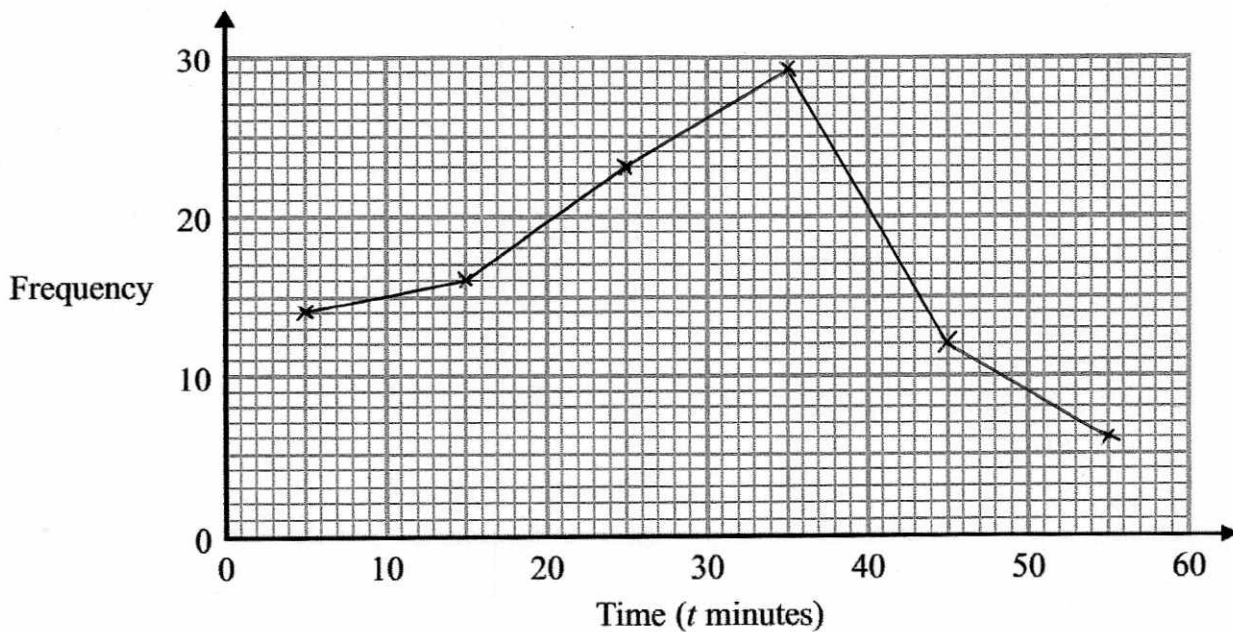
(a) Find the percentage of people that travelled for more than 30 minutes to the event

$$29 + 12 + 6$$

$$\frac{47}{100} \times 100\%$$

(2)  
(1)

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



(2)

3  
(Total for question 17 is 3 marks)

18 (a) Find the reciprocal of 8

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

(1)

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

$$21.95067518$$

(2)

(Total for question 18 is 3 marks)

19 Solve the simultaneous equations

$$\begin{array}{l} 2x + 5y = 2 \quad \times 7 \\ 7x - 4y = -1 \quad \times 2 \end{array}$$

$$\begin{array}{r} 14x + 35y = 14 \\ 14x - 8y = -2 \end{array}$$

$$43y = 16$$

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

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

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

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

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

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

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

(Total for question 19 is 3 marks)

20

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

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)

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.

$$\text{London: } \underline{\underline{\pounds 1 = \$1.31}}$$

$$\text{New York } \$1 = \pounds 0.79$$

$$\div 0.79 \quad \div 0.79$$

$$\underline{\underline{\$1.27 = \pounds 1}}$$

London

---

(Total for question 22 is ~~2~~ marks)

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?

$$2534 = 103\%$$

$$24.6 = 1\%$$

$$2460.19 = 100\% \quad [2017]$$

$$2460.19 = 102\%$$

$$\cancel{2460.19} = 1\%$$

$$24.12$$

$$2411.96 = 100\% \quad [2016]$$

£.....2411.96.....

(Total for question 23 is 3 marks)

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.

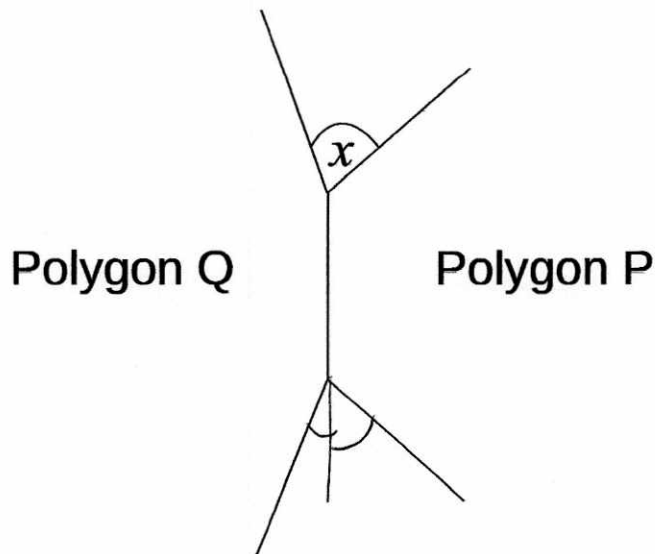
$$\frac{\text{change}}{\text{original}} \times 100$$

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

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

Find the size of angle  $x$  in terms of  $n$ .

$$\text{Exterior Angle of } P = \frac{360}{n}$$

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

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

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

$$= \frac{540}{n}$$

$$\frac{540}{n}$$

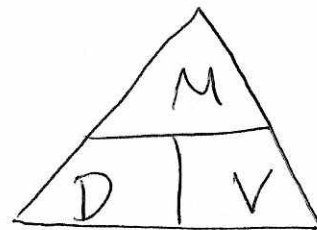
(Total for question 25 is 3 marks)

26 Liquid A has a density of  $1.2 \text{ g/cm}^3$

150 cm<sup>3</sup> 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  $1.12 \text{ g/cm}^3$

Find the density of Liquid B.



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

$$\begin{aligned} \text{Liquid A : mass} &= \text{density} \times \text{volume} \\ &= 1.2 \times 150 \\ &= 180 \text{ g} \end{aligned}$$

$$\begin{aligned} \text{Liquid C: volume} &= \frac{\text{mass}}{\text{density}} \\ &= \frac{210}{1.12} \\ &= 187.5 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Liquid B Mass} &= 210 - 180 = 30 \text{ g} \\ \text{volume} &= 187.5 - 150 \\ &= 37.5 \end{aligned}$$

$$\text{Density} = \frac{30}{37.5} = 0.8$$

.....0.8.....g/cm<sup>3</sup>

(Total for question 26 is 3 marks)



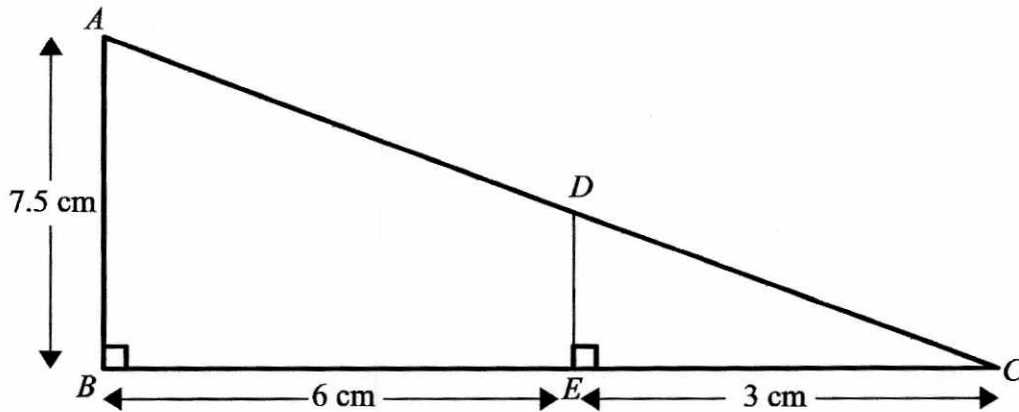
27 Solve  $n^2 - 49 = 0$

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

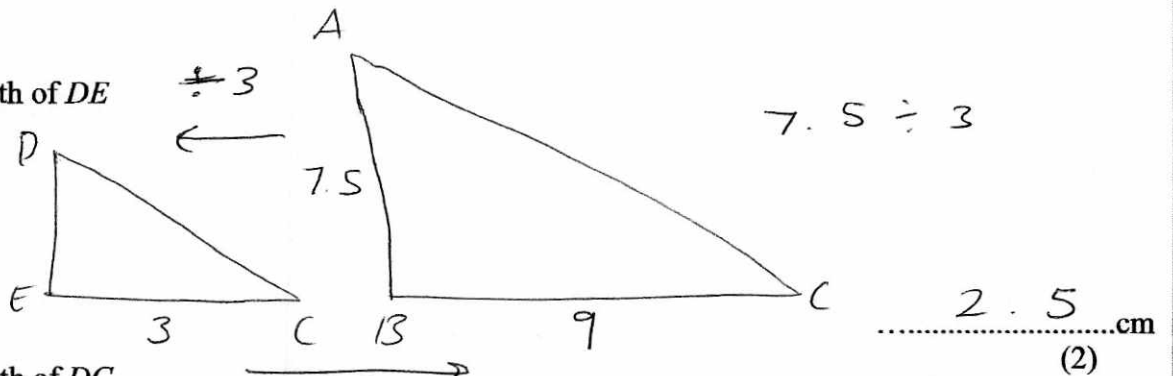
$$n = 7 \text{ or } n = -7$$

(Total for question 27 is 2 marks)

28

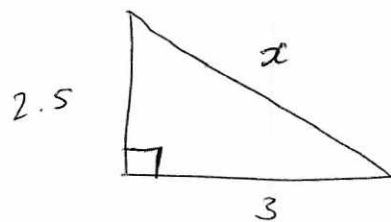


(a) Find the length of DE



(b) Find the length of DC

Give your answer correct to 1 decimal place.



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

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

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

$$= 3.9$$

$$\dots\dots\dots 3.9 \text{ cm}$$

(3)

(Total for question 28 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS