

Write your name here

Surname

Other Names

# Mathematics

## Paper 1 (Non-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.

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 not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



### 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.

## Foundation Tier Formulae Sheet

### Perimeter, area and volume

Where  $a$  and  $b$  are the lengths of the parallel sides and  $h$  is their perpendicular separation:

$$\text{Area of a trapezium} = \frac{1}{2}(a + b)h$$

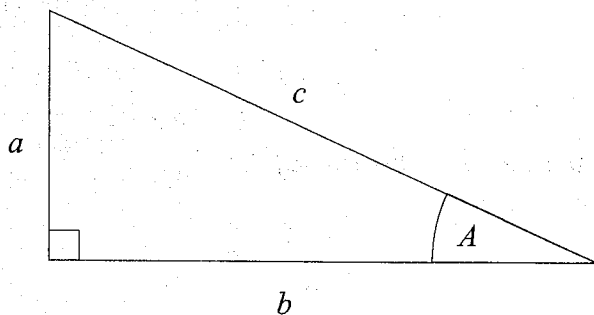
Volume of a prism = area of cross section  $\times$  length

Where  $r$  is the radius and  $d$  is the diameter:

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

### Pythagoras' Theorem and Trigonometry



In any right-angled triangle where  $a$ ,  $b$  and  $c$  are the length of the sides and  $c$  is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle  $ABC$  where  $a$ ,  $b$  and  $c$  are the length of the sides and  $c$  is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

### Compound Interest

Where  $P$  is the principal amount,  $r$  is the interest rate over a given period and  $n$  is number of times that the interest is compounded:

$$\text{Total accrued} = P \left( 1 + \frac{r}{100} \right)^n$$

### Probability

Where  $P(A)$  is the probability of outcome  $A$  and  $P(B)$  is the probability of outcome  $B$ :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

**END OF EXAM AID**

1 Write  $\frac{2}{5}$  as a percentage

$$\frac{2}{5} = \frac{4}{10} = \frac{40}{100}$$

..... 40 %

(Total for Question 1 is 1 mark)

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2 Here is a list of numbers

7

14

17

21

32

From the list, write down a multiple of 3.

..... 21

(Total for Question 2 is 1 mark)

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3 Simplify  $e \times e \times e \times e$

.....  $e^4$

(Total for Question 3 is 1 mark)

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4 Change 400 centimetres into metres

..... 4 metres

(Total for Question 4 is 1 mark)

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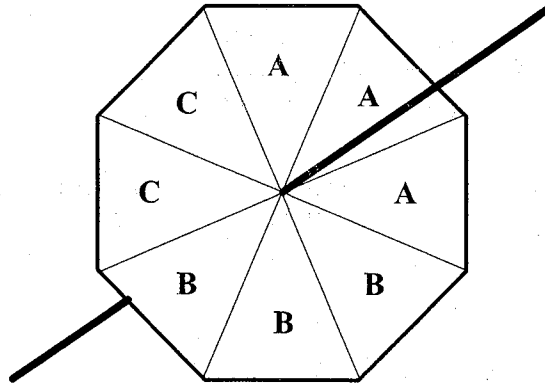
5 Write 7829 to the nearest 10

..... 7830

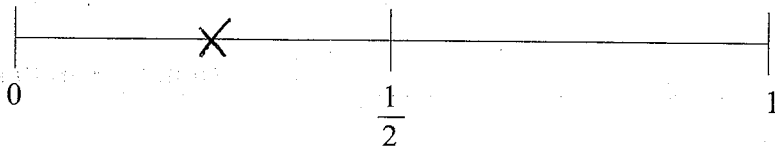
(Total for Question 5 is 1 mark)

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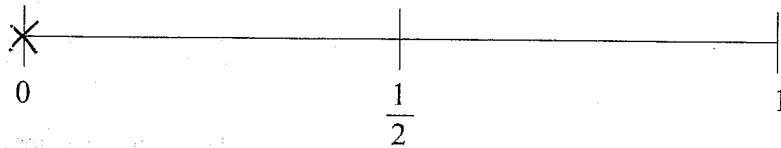
6 Gita spins a fair 8-sided spinner.



(a) On the probability scale, mark with a cross (X) the probability that the spinner will land on C.











(b) On the probability scale, mark with a cross (X) the probability that the spinner will land on D.



(Total for Question 6 is 2 marks)

7 There are only apple trees, cherry trees, pear trees and plum trees in an orchard.

The pictogram shows information about the numbers of apple trees, cherry trees and pear trees in the orchard.

|        |   |   |   |    |
|--------|---|---|---|----|
| Apple  |  |  |  | 10 |
| Cherry |  |  |   | 5  |
| Pear   |  |  |   | 8  |
| Plum   |  |   |   |    |

Key:



represents 4 trees

There is a total of 26 trees in the orchard.  
Complete the pictogram.

$$10 + 5 + 8 = 23$$

$$26 - 23 = 3$$

(Total for Question 7 is 3 marks)

8 5 kg of meat costs £65  
Nina buys 3 kg of the meat.

$$5 \overline{) 65}$$

Work out how much Nina pays.

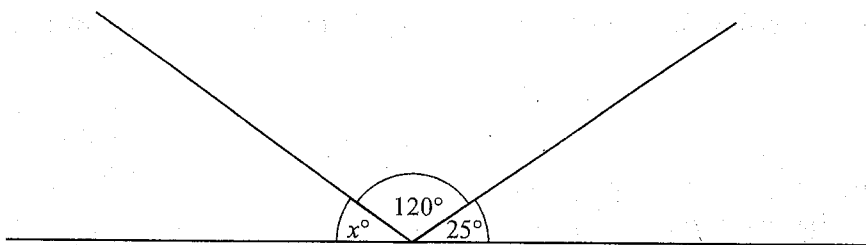
1 kg costs £13

$$13 \times 3 = \underline{\underline{39}}$$

£ 39

(Total for Question 8 is 2 marks)

9  $PQR$  is a straight line.



Work out the size of angle  $x$ .

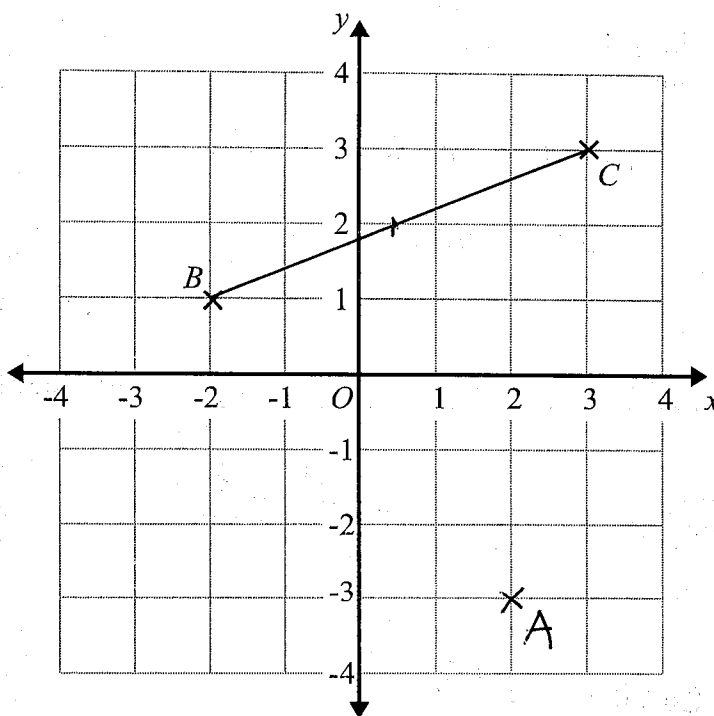
$$120 + 25 = 145$$

$$\begin{array}{r} 7 \\ 180 \\ - 145 \\ \hline 35 \end{array}$$

35°

(Total for Question 9 is 2 marks)

10



(a) Plot the point with coordinates  $(2, -3)$   
Label this point  $A$ .

(1)

(b) Write down the coordinates of the midpoint of  $BC$ .

$(0.5, 2)$

(1)

(Total for Question 10 is 2 marks)

- 11 At the end of October, Fiona's electricity meter reads 88 957 kWh.  
At the end of November, her electricity meter reads 89 317 kWh.

Each kWh of electricity Fiona uses costs 29p.

Work out how much Fiona had to pay for the electricity she used in November.

$$\begin{array}{r} 89\,317 \\ - 88\,957 \\ \hline 00\,360 \end{array}$$

$$360 \times 29$$

$$\begin{array}{r} 360 \\ \times 29 \\ \hline 3240 \\ + 7200 \\ \hline 10440 \end{array}$$

$$10440p \text{ or } \pounds 104.40$$

£104.40

(Total for Question 11 is 4 marks)

- 12 (a) A bag contains red counters and blue counters only.

number of red counters : number of blue counters = 2 : 5      7 parts

Write down the fraction of the counters that are red.

$$\frac{2}{7}$$

- (b) Write the ratio 18 : 24 in the form 1 :  $n$

$$9 : 12$$

$$3 : 4$$

$$1 : \frac{4}{3}$$

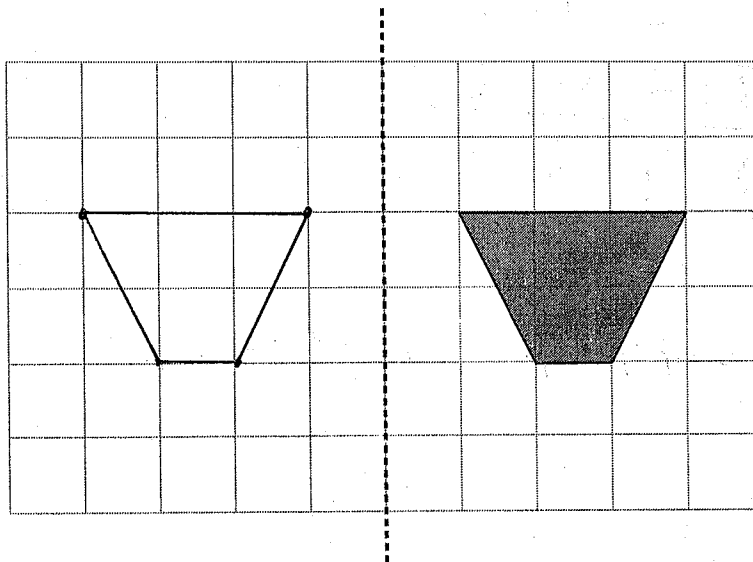
$$1 : \frac{4}{3}$$

(2)

(Total for Question 12 is 3 marks)

13

mirror line



Reflect the shaded shape in the mirror line.

(Total for Question 13 is 2 marks)



14 Tim and two friends go on holiday together for a week.

The 3 friends will share the costs of the holiday equally.

Here are the costs of the holiday.

£930 for 3 return plane tickets

£540 for the villa

£192 for hire of a car for the week

Work out how much Tim has to pay for his share of the costs.

$$\begin{array}{r} 930 \\ 540 \\ + 192 \\ \hline 1662 \end{array}$$

£1662 in total

$$\begin{array}{r} 0554 \\ 3 \overline{) 1662} \end{array}$$

£ 554

(Total for Question 14 is 3 marks)

15 A number sequence starts 1 2 4

Emma says that the next term is 8

(a) Explain why Emma may be correct

Emma is correct if the rule is double the  
previous term

(1)

Here are the first four terms of the sequence of Fibonacci numbers.

1 1 2 3 5 8 13 21

(b) Find the 8th term of this sequence

21

(2)

(Total for Question 15 is 3 marks)

16  $y = 3x - 7$

Work out the value of  $y$  when  $x = 2$

$$\begin{aligned} y &= 3(2) - 7 \\ &= 6 - 7 \\ &= -1 \end{aligned}$$

$y = \underline{\quad - 1 \quad}$

(Total for Question 16 is 2 marks)

17 (a) Expand  $4(a - 5)$

$\underline{\quad 4a - 20 \quad}$   
(1)

(b) Factorise  $6y + 9$

$\underline{\quad 3(2y + 3) \quad}$   
(1)

(c)  $\frac{8x - 7}{+1} = \frac{17}{+1}$

$$8x = 24$$

$$x = 3$$

$x = \underline{\quad 3 \quad}$   
(2)

(Total for Question 17 is 4 marks)

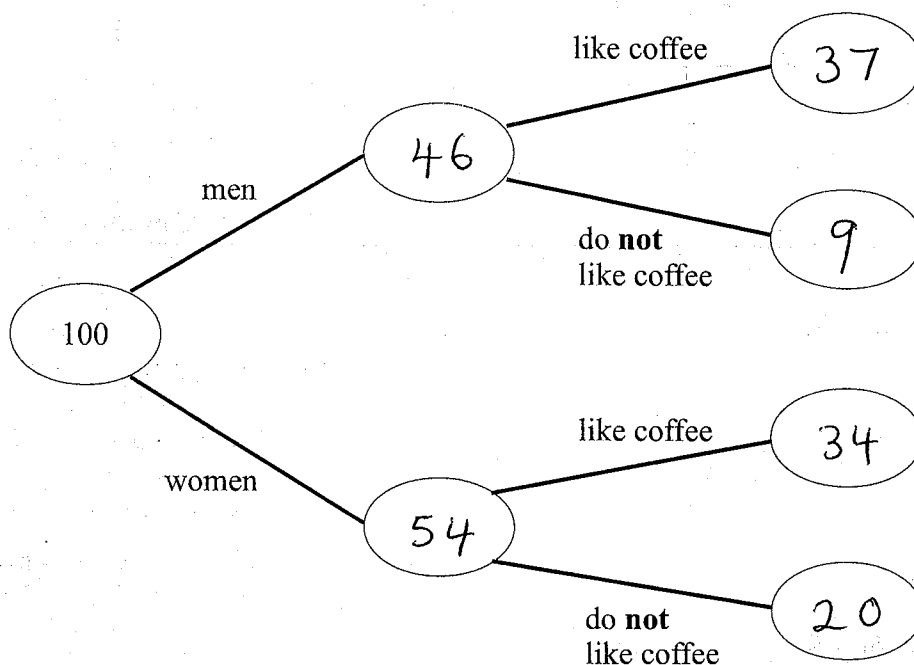
18 100 people are asked if they like coffee.

54 of these people are women.  $100 - 54 = 46$

71 of the 100 people like coffee.

9 of the men do not like coffee.  $46 - 9 = 37$  (men like coffee)

(a) Use this information to complete the frequency tree.  $71 - 37 = 34$  (women like coffee)



(3)

One of the people who like coffee is chosen at random.

(b) Find the probability that this person is a woman.

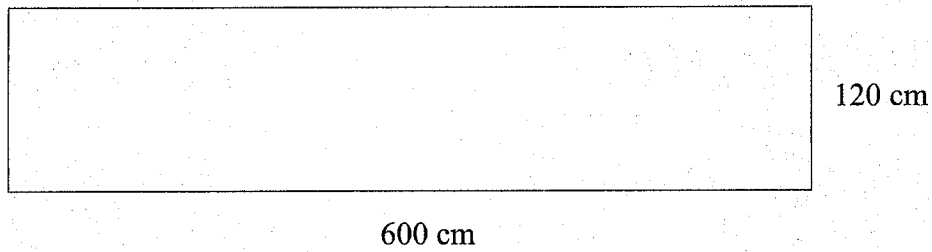
out of 71

$$\frac{34}{71}$$

(2)

(Total for Question 18 is 5 marks)

19 The diagram shows a rectangular garden path.



Harry is going to cover the path with paving stones.

Each paving stone is a square of side 40 cm.

Each paving stone costs £6

$$\frac{120}{40} = \frac{12}{4} = 3 \text{ (stones up)}$$

Harry has £280 to spend on paving stones.

$$\frac{600}{40} = 15 \text{ (stones across)}$$

Show that he has enough money to buy all the paving stones he needs.

$$3 \times 15 = 45 \text{ stones needed}$$

$$\begin{array}{r} 45 \\ \times 6 \\ \hline 270 \end{array}$$

The stones cost £270

$$£280 > £270$$

20

Work out an estimate for  $\frac{49 \times 31}{0.52}$ 

$$\frac{50 \times 30}{0.5} = \frac{1500}{0.5}$$

$$= 3000$$

.....  
3000

(Total for Question 20 is 3 marks)

21 Here is a list of ingredients for making 10 scones.

| Ingredients for 10 scones |                    |
|---------------------------|--------------------|
| 75g                       | butter             |
| 350g                      | self-raising flour |
| 40g                       | sugar              |
| 150 ml                    | milk               |
| 2                         | eggs               |

half as much  
↓  
5 scones

175g

Mia wants to make 15 scones.

Work out how much self-raising flour she needs.

15 scones = 10 scones + 5 scones

$$\begin{array}{r} 350 \\ + 175 \\ \hline 525 \end{array}$$

.....  
525 g

(Total for Question 21 is 2 marks)

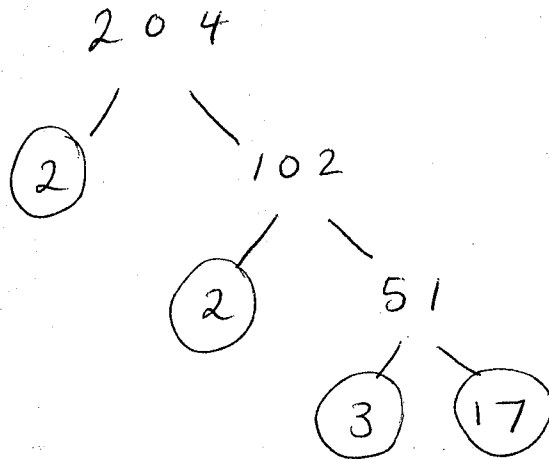
22 Work out  $46.3 \times 5.8$

$$\begin{array}{r} 46.3 \\ \times 5.8 \\ \hline 3704 \\ 23150 \\ \hline 26854 \end{array}$$

268.54

(Total for Question 22 is 3 marks)

23 Write 204 as a product of its prime factors.



$$\underline{2 \times 2 \times 3 \times 17}$$

(Total for Question 23 is 2 marks)

24 Show that  $1\frac{2}{3} \times 3\frac{1}{5} = 5\frac{1}{3}$

$$\frac{\cancel{8}}{3} \times \frac{16}{\cancel{8}} = \frac{16}{3} = \underline{\underline{5\frac{1}{3}}}$$

(Total for Question 24 is 3 marks)



- 25  $A$  Abbie is 9 years older than Ben.  $B$   
 $C$  Charlotte is twice as old as Abbie.  
The sum of their three ages is 67

Find the ratio of Abbie's age to Ben's age to Charlotte's age

$$A - 9 = B$$

$$C = 2A$$

$$A + B + C = 67$$

$$A + (A - 9) + (2A) = 67$$

$$4A - 9 = 67$$

$$4A = 76$$

$$A = \frac{76}{4} = \underline{\underline{19}}$$

$$\begin{aligned} B &= A - 9 \\ &= 19 - 9 \\ &= \underline{\underline{10}} \end{aligned}$$

$$\begin{aligned} C &= 2A \\ &= 2(19) \\ &= \underline{\underline{38}} \end{aligned}$$

$$\underline{\underline{19:10:38}}$$

(Total for Question 25 is 4 marks)

26 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

5 pens in each pack of black pens

4 pens in each pack of red pens

3 pens in each pack of green pens

On Monday,

number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold = 8 : 5 : 2

A total of 264 pens were sold.

Work out the number of green pens sold.

Number of pens sold

Black : Red : Green

$5 \times 8$  :  $4 \times 5$  :  $3 \times 2$

40 : 20 : 6 (66 parts)

$$\frac{264}{66} = \frac{132}{33} = \frac{12}{3} = 4 \quad (4 \text{ pens for each part})$$

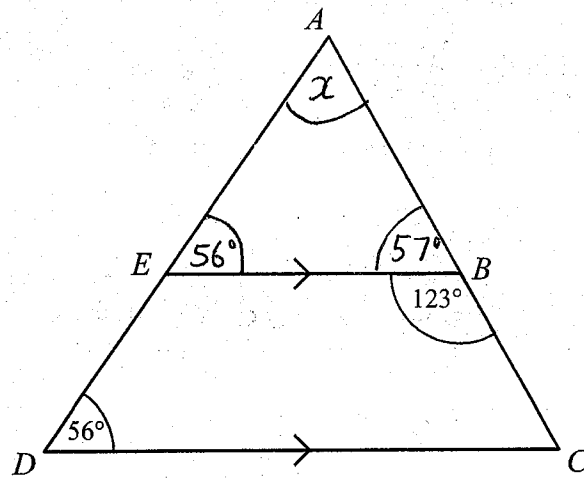
$40 \times 4$  :  $20 \times 4$  :  $6 \times 4$

160 : 80 : 24

24

(Total for Question 26 is 4 marks)

27 *ADC* is a triangle.



*AED* and *ABC* are straight lines.  
*EB* is parallel to *DC*.

Angle *EBC* =  $123^\circ$   
Angle *ADC* =  $56^\circ$

Work out the size of angle *EAB*.  
You must give a reason for each stage of your working.

Angle *AEB* =  $56^\circ$  Corresponding angles are equal

Angle *ABE* =  $57^\circ$  Angles on a straight line add to  $180^\circ$

$$180 - 57 - 56 = 67^\circ$$

*EAB* =  $67^\circ$  Angles in a triangle add to  $180^\circ$

(Total for Question 27 is 5 marks)

28

A car travels for 42 minutes at an average speed of 90 km/h.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

(a) How far will the car travel in these 42 minutes?

$$\text{distance} = \text{speed} \times \text{time}$$

$$42 \text{ minutes} = \frac{42}{60} = \frac{21}{30} = \frac{7}{10} \text{ of an hour}$$

$$\text{distance} = 90 \times \frac{7}{10}$$

$$= 9 \times 7 = \underline{\underline{63}}$$

$$\underline{\underline{63}} \text{ km} \\ (2)$$

David says,

"90 kilometres per hour is faster than 25 metres per second."

(b) Is David correct?

You must show how you get your answer

90 km in 1 hour

90000 m in 1 hour

$$\frac{90000}{60} = \frac{4500}{3} = 1500 \text{ m in 1 minute}$$

$$\frac{1500}{60} = \frac{75}{3} = 25 \text{ m in 1 second}$$

$$= 25 \text{ m/s}$$

No. They are the same.

(2)

(Total for Question 28 is 4 marks)

29 At the end of 2017  
 the value of Micah's house was £240 000  
 the value of Nora's house was £180 000

At the end of 2019  
 the value of Micah's house had decreased by 11%  
 the value of Nora's house had increased by 15%

At the end of 2019, whose house had the greater value?  
 You must show how you get your answer.

Micah's house

$$10\% \text{ of } 240000 = \frac{240000}{10}$$

$$= 24000$$

$$1\% \text{ of } 240000 = \frac{240000}{100}$$

$$= 2400$$

$$11\% = 24000 + 2400$$

$$= 26400$$

$$\begin{array}{r} 240000 \\ - 26400 \\ \hline 213600 \end{array}$$

£ 213 600

Nora's house

$$10\% \text{ of } 180000 = \frac{180000}{10}$$

$$= 18000$$

$$5\% \text{ of } 180000 = \frac{180000}{20}$$

$$= 9000$$

$$15\% = 18000 + 9000$$

$$= 27000$$

$$\begin{array}{r} 180000 \\ + 27000 \\ \hline 207000 \end{array}$$

£ 207 000

Micah's house

(Total for Question 29 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

