Name ANSWERS	Class

MATHS TEACHER HUB

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Estimation

(9 – 1) Topic booklet

Foundation

These questions have been collated from previous years GCSE Mathematics papers.

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.*
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- If the question is a **1F** question you are not allowed to use a calculator.
- If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information

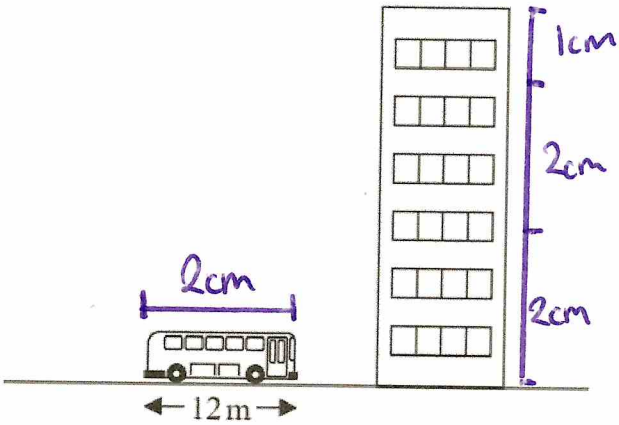
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

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.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

8



The picture shows a bus next to a building.
The bus has a length of 12 m.

The bus and the building are drawn to the same scale.

Work out an estimate for the height, in metres, of the building.

12m + 12m + 6m

30 ..... m

(Total for Question 8 is 2 marks)

8 Jayne writes down the following

$$3.4 \times 5.3 = 180.2$$

Without doing the exact calculation, explain why Jayne's answer cannot be correct.

3 x 5 = 15

(Total for Question 8 is 1 mark)

11 A total of 700 tickets were on sale for a football match.

452 of the tickets were sold.

(a) How many tickets were **not** sold?

6 9
~~7~~00
-452
248

248

(2)

For a different football match,

297 tickets were sold for £9.50 each.
399 tickets were sold for £19.50 each.

(b) Work out an estimate for the total amount of money paid for these tickets.
You must show all your working.

300 x £10 = £3000
400 x £20 = £8000
£11000

£ 11000

(3)

(c) Is your answer to part (b) an underestimate or an overestimate?
Give a reason for your answer.

Over estimate, as all the values were rounded up.

(1)

(Total for Question 11 is 6 marks)

12 Rehan is on holiday in the USA.

He has \$200 to spend on clothes.

Rehan buys

1 pair of trainers costing \$60
3 T-shirts costing \$25 each.

He also wants to buy a jacket costing \$80

(a) Has Rehan got enough money to buy the jacket?
You must show how you get your answer.

\$60
\$25
\$25
\$25
135

\$135
+ 80
215

No he does not have enough.
he needs \$215 and only has \$200.

(3)

The trainers cost \$60
The exchange rate is \$1 = £0.749

Rehan says,

"The trainers cost less than £40"

Rehan is wrong.

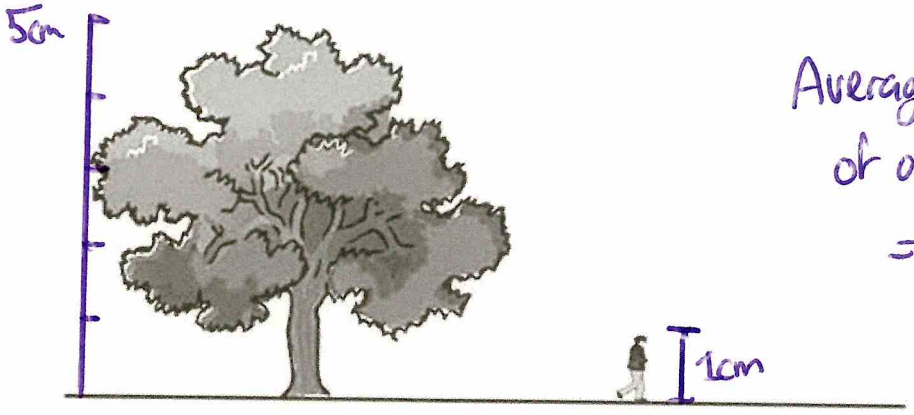
(b) Using a suitable approximation, show working to explain why.

60 x 0.7 = 42

(2)

(Total for Question 12 is 5 marks)

13 The diagram shows a tree and a man.



Average height of adult man = 1·8m

The man is of average height.
The tree and the man are drawn to the same scale.

(a) Write down an estimate for the real height, in metres, of the man.

1·8 metres

1·5 ↔ 2 (1)

(b) Find an estimate for the real height, in metres, of the tree.

1·8 × 5 = 9m
2 × 5 = 10m
1·5 × 5 = 7·5m

9 metres

7·5 ↔ 10

(Total for Question 13 is 3 marks)

13 Paul organised an event for a charity.

Each ticket for the event cost £19.95 → £20
Paul sold 395 tickets. → 400 tickets

Paul paid costs of £6000
He gave all money left to the charity.

(a) Work out an estimate for the amount of money Paul gave to the charity.

400 × £20 = 8000

8000 − 6000 = 2000

£ 2000

(3)

(b) Is your answer to (a) an underestimate or an overestimate?
Give a reason for your answer.

Overestimate, as all values were rounded up.

(1)

(Total for Question 13 is 4 marks)

14 A unit of gas costs 4.2 pence. → 4p

On average Ria uses 50.1 units of gas a week. → 50 units
She pays for the gas she uses in 13 weeks.

(a) Work out an estimate for the amount Ria pays.

4p × 50 = 200p

200p × 13 = 2600p

= £26

£26

(3)

(b) Is your estimate to part (a) an underestimate or an overestimate?
Give a reason for your answer.

Under estimate, as two values were rounded down.

(1)

(Total for Question 14 is 4 marks)

15 (a) Work out an estimate for the value of 92×1.63
You must show all your working.

$90 \times 2 = 180$

180

(2)

Given that

$2.96 \times 3.2 = 9.472$

(b) find the value of 29.6×32

947.2

(1)

(Total for Question 15 is 3 marks)

16 Berenika wants to buy 35 T-shirts.

Each T-shirt costs £5.80
Berenika does the calculation $40 \times 6 = 240$ to estimate the cost of 35 T-shirts.

(a) Explain how Berenika's calculation shows the actual cost will be less than £240

£5·80 and 35 were both rounded up; so £240 is higher than the actual answer.

(1)

There is a special offer.

T-shirts £5.80 each. Buy 30 or more T-shirts. Get 10% off the total cost.

(b) Work out the actual cost of buying 35 T-shirts using the special offer.

35 x £5·80 = £203·00

580
x 35
2900
17400
20300

203 = 100%
20·30 = 10%

£203·00
- 20·30
182·70

£ 182·70

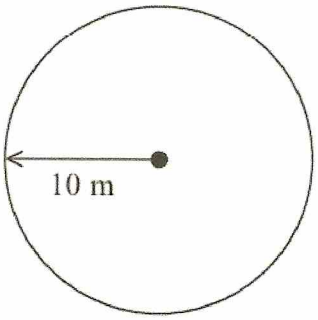
(4)

(Total for Question 16 is 5 marks)

18 Balena has a garden in the shape of a circle of radius 10 m.
He is going to cover the garden with grass seed to make a lawn.

Grass seed is sold in boxes.
Each box of grass seed will cover 46 m^2 of garden. → $50m^2$

Balena wants to cover all the garden with grass seed.



(a) Work out an estimate for the number of boxes of grass seed Balena needs.
You must show your working.

Area = $\pi \times 10^2$

$= 3 \times 100$

$= 300m^2$

$\frac{300}{50} = 6$ boxes

6

(4)

(b) Is your estimate for part (a) an underestimate or an overestimate?
Give a reason for your answer.

Underestimate, the area is greater than 300 and the seed is less than 50.

(1)

(Total for Question 18 is 5 marks)

18 Work out an estimate for $\frac{790 \times 289}{49}$

$$\frac{800 \times 300}{50} = \frac{240000}{50}$$

$$= \frac{250000}{50}$$

$$= \frac{25000}{5}$$

5000

May 2020 – Paper 1F **(Total for Question 18 is 3 marks)**

20 Ami and Josh use a calculator to work out $\dfrac{595}{4.08^2 + 5.3}$

Ami's answer is 27.1115
Josh's answer is 271.115

One of these answers is correct.

Use approximations to find out which answer is correct.

$\dfrac{600}{4^2+5} = \dfrac{600}{16+5}$

$= \dfrac{600}{21}$

$= \dfrac{600}{20}$

$= 30$

Ami's answer is close to 30

(Total for Question 20 is 3 marks)

→ 3000 miles

22 A cycle race across America is 3069.25 miles in length. → 15 miles per day

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.

$\frac{3000}{15} = 200$ hours

$\frac{200}{8} = 25$ days

25

(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

(b) How does this affect your answer to part (a)?

The faster he cycles, the fewer days needed

(1)

(Total for Question 22 is 4 marks)

→ 200 mph

24 A plane travels at a speed of 213 miles per hour.

(a) Work out an estimate for the number of seconds the plane takes to travel 1 mile.

200 miles in 1 hour
200 miles in 60 minutes
200 miles in 3600 seconds
100 miles in 1800 seconds
1 miles in 18 seconds

18 seconds

(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

Over estimate, the plane will travel more distance than 200 miles in 1 hour.

(1)

(Total for Question 24 is 4 marks)

→ 500 km

24 Sophie drives a distance of 513 kilometres on a motorway in France.
She pays 0.81 euros for every 10 kilometres she drives.

(a) Work out an estimate for the total amount that Sophie pays.

$\frac{500}{10} \times 0.8$

$50 \times 0.8 = 40$

40 euros

(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

Underestimate, distance and cost were both rounded down.

(1)

(Total for Question 24 is 4 marks)

24 Lara is a skier.

→ 2 minutes

She completed a ski race in 1 minute 54 seconds.
The race was 475 m in length.

→ 500m

Lara assumes that her average speed is the same for each race.

(a) Using this assumption, work out how long Lara should take to complete a 700 m race.
Give your answer in minutes and seconds.

$\frac{500 \text{ metres}}{2 \text{ minutes}} = 250 \text{ metres per minute}$

$\frac{700}{250} = \frac{70}{25} = \frac{7}{2.5} = \frac{14}{5} = \frac{28}{10} = 2.8$

= 2 minutes 48 seconds

2 minutes 48 seconds

(3)

Lara's average speed actually increases the further she goes.

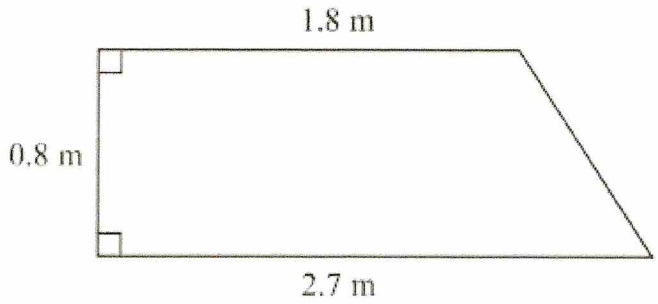
(b) How does this affect your answer to part (a)?

it would take less time

(1)

(Total for Question 24 is 4 marks)

25 The diagram shows part of a wall in the shape of a trapezium.



Karen is going to cover this part of the wall with tiles.
Each rectangular tile is 15 cm by 7.5 cm

Tiles are sold in packs.
There are 9 tiles in each pack.

Karen divides the area of the wall by the area of a tile to work out an estimate for the number of tiles she needs to buy.

(a) Use Karen's method to work out an estimate for the number of packs of tiles she needs to buy.

$\text{Area} = \frac{(1.8 + 2.7) \times 0.8}{2} = 1.8\text{m}^2$

$= 18000\text{cm}^2$

$\text{Tile} = 15 \times 7.5 = 112.5\text{cm}^2$

$\frac{18000}{112.5} = 160$ tiles

$\frac{160}{9} = 17.7$ packs

18

(5)

Karen is advised to buy 10% more tiles than she estimated.
Buying 10% more tiles will affect the number of the tiles Karen needs to buy.

She assumes she will need to buy 10% more packs of tiles.

(b) Is Karen's assumption correct?
You must show your working.

18 packs
10% = 1.8
20 packs

160 tiles
10% = 16
176 tile

$\frac{176}{9} = 20$ packs

Yes she is correct.

(2)

(Total for Question 25 is 7 marks)

26 Work out an estimate for $\dfrac{5.7 \times 8.2}{0.26}$

$$\frac{6 \times 8}{0.2} = \frac{48}{0.2} = \frac{480}{2} = 240$$

240

November 2023 – Paper 1F

(Total for Question 26 is 3 marks)