

GCSE MATHS • GRADE 3

MATHS



MODEL ANSWERS

ESTIMATION

SCORE

/92

PERCENTAGE

%

STEM UP

- 1 Work out an estimate for the value of
 $107 \div 5.1$

$$100 \div 5 = 20$$

20

/ 1

- 2 Work out an estimate for the value of
 $(78.4 \times 62) \div 8.12$

$$80 \times 60 \div 8 = 600$$

600

/ 1

- 3 Work out an estimate for the value of
 $(31.3 + 59.9) \div 6.2$

$$(30 + 60) \div 6 = 15$$

15

/ 1

- 4 Work out an estimate for the value of
 $219 \div 19$

$$200 \div 20 = 10$$

10

1 / 1

- 5 Work out an estimate for the value of
 $(3.5 \times 91) \div 54$

$$4 \times 90 \div 50 = 7.2$$

7.2

1 / 1

- 6 Work out an estimate for the value of
 $(2.41 + 41) \div 9.58$

$$(2 + 40) \div 10 = 4.2$$

4.2

1 / 1

- 7 Work out an estimate for the value of

$$\frac{74 \times 34}{2.4} = 1,050$$

1,050

1 / 1

- 8 Work out an estimate for the value of

$$(8.3 \times 4.6) \div 4.3$$

$$8 \times 5 \div 4 = 10$$

10

1 / 1

- 9 Work out an estimate for the value of

$$(18.5 + 7.52) \div 3.5$$

$$(20 + 8) \div 4 = 7$$

7

1 / 1

- 10 Work out an estimate for the value of

$$\frac{5.49 \times 622}{0.2} = 15,000$$

15,000

/ 1

- 11 Work out an estimate for the value of

$$19.9^2 \times 8.6$$

$$20^2 \times 9 = 3,600$$

3,600

/ 1

- 12 Work out an estimate for the value of

$$(45.5 + 94.6) \div 13$$

$$(50 + 90) \div 10 = 14$$

14

/ 1

- 13 Work out an estimate for the value of

$$\frac{90.6 \times 3.6}{26}$$
$$\frac{90 \times 4}{30} = 12$$

12

/ 1

- 14 Work out an estimate for the value of

$$10.2^2 \times 81.2$$
$$10^2 \times 80 = 8,000$$

8,000

/ 1

- 15 Work out an estimate for the value of

$$(88.1 \times 1.3) \div 0.25$$
$$90 \times 1 \div 0.3 = 300$$

300

/ 1

- 16 Work out an estimate for the value of

$$\frac{49.7 + 8.7}{0.11} \times \frac{50 + 9}{0.1} = 590$$

590

 / 1

- 17 Work out an estimate for the value of

$$5.36^2 \times 49.3$$
$$5^2 \times 50 = 1,250$$

1,250

 / 1

- 18 Work out an estimate for the value of

$$(58.4 \times 71.5) \div 0.957$$
$$60 \times 70 \div 1 = 4,200$$

4,200

 / 1

- 19 Work out an estimate for the value of

$$\frac{48 + 245}{0.39} \approx \frac{50 + 200}{0.4} = 625$$

625

/ 1

- 20 Work out an estimate for the value of

$$3.1^2 \times 41$$

$$3^2 \times 40 = 360$$

360

/ 1

- 21 A circular table has a radius of 2.7 m.

By rounding each number to 1 significant figure, work out an estimate for the area of the table.

Use $\pi = 3$.

$$\text{radius} \approx 3$$

$$\text{area} \approx 3 \times 3^2 = 27$$

27 m²

/ 2

- 22 Work out an estimate for the value of
 $(1.16 + \sqrt{104.2}) \div 1.01$

$$1 + \sqrt{100} = 1 + 10, \text{ then } \div 1$$

11

2 / 2

- 23 Chloe's mobile phone costs 6.3p for every minute of calls.
 Chloe makes calls for 77 minutes each day for 41 days.
 Work out an estimate for the total cost of the calls. Give your answer in pounds (£).

$$6 \times 80 \times 40 = 19,200p = \pounds 192$$

£192

2 / 2

- 24 A circular lawn has a radius of 7.1 cm.
 By rounding each number to 1 significant figure, work out an estimate for the area of the lawn.
 Use $\pi = 3$.

$$\text{radius} \approx 7$$

$$\text{area} \approx 3 \times 7^2 = 147$$

147 cm²

2 / 2

- 25 Ava uses a calculator to work out $(86 \times 95) \div 3.7$
 Ava's answer is 220.
 Gary's answer is 2,200.
 One of the answers is correct.
 Use approximations to find out which answer is correct.

*estimate = $90 \times 100 \div 4 = 2,250$, which is
 close to 2,200*

Gary, answer 2,200

/ 2

- 26 Richard's mobile phone costs 4.6p for every minute of calls.
 Richard makes calls for 63 minutes each day for 88 days.
 Work out an estimate for the total cost of the calls. Give your answer in pounds (£).

$5 \times 60 \times 90 = 27,000p = £270$

£270

/ 2

- 27 A circular lawn has a radius of 9.6 cm.
 By rounding each number to 1 significant figure, work out an estimate for the area of the lawn.
 Use $\pi = 3$.

*radius ≈ 10
 area $\approx 3 \times 10^2 = 300$*

300 cm²

/ 2

- 28 Zara uses a calculator to work out $(57.9 \times 68) \div 6.74$
 Zara's answer is 5,800.
 Hannah's answer is 580.
 One of the answers is correct.
 Use approximations to find out which answer is correct.

estimate = $60 \times 70 \div 7 = 600$, which is close to 580

Hannah, answer 580

/ 2

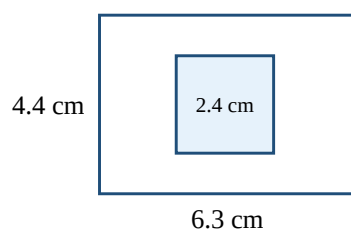
- 29 Priya's mobile phone costs 2.3p for every minute of calls.
 Priya makes calls for 45 minutes each day for 54 days.
 Work out an estimate for the total cost of the calls. Give your answer in pounds (£).

$2 \times 50 \times 50 = 5,000p = £50$

£50

/ 2

- 30 The diagram shows a rectangle with a square cut out of it. The square is shaded.
 Work out an estimate for the area of the rectangle that is not shaded.
 You must show your rounding of each number to 1 significant figure. Diagram NOT accurately drawn.



$$6 \times 4 - 2 \times 2 = 24 - 4 = 20$$

20 cm²

/ 2

- 31 Amelia uses a calculator to work out $(55.8 \times 7.32) \div 59.2$
 Amelia's answer is 0.69.
 Hannah's answer is 6.9.
 One of the answers is correct.
 Use approximations to find out which answer is correct.

estimate = $60 \times 7 \div 60 = 7$, which is close to 6.9

Hannah, answer 6.9

/ 2

- 32 Noah spends an average of £32.5 on food each week.
 (a) Work out an estimate for the amount Noah spends on food in a year.
 (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

*1 year = 52 weeks
 32.5 rounds to 30 and 52 rounds to 50
 $30 \times 50 = 1,500$
 both 32.5 and 52 were rounded down, so the estimate is smaller than the true value*

(a) £1,500 (b) Underestimate, both 32.5 and 52 were rounded down

/ 2

- 33 Dermot uses a calculator to work out the value of

$$\frac{763.3}{15.1 + 4.8^2}$$

Dermot's answer is 2.

Amelia's answer is 20.

One of the answers is correct.

Use approximations to find out which answer is correct.

*round to 1 s.f.: $800 \div (20 + 5^2) = 800 \div (20 + 25) = 800 \div 45 = 17.8$ (to 1 d.p.)
 this is close to 20*

Amelia, answer 20

/ 2

- 34 Zara uses a calculator to work out $(650 \times 30.1) \div 66.3$
 Zara's answer is 300.
 Abbie's answer is 3,000.
 One of the answers is correct.
 Use approximations to find out which answer is correct.

estimate = $700 \times 30 \div 70 = 300$, which is close to 300

Zara, answer 300

/ 2

- 35 Zara drives an average of 33.5 miles per week.
 (a) Work out an estimate for the number of miles Zara drives in a year.
 (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

*1 year = 52 weeks
 33.5 rounds to 30 and 52 rounds to 50
 $30 \times 50 = 1,500$
 both 33.5 and 52 were rounded down, so the estimate is smaller than the true value*

*(a) 1,500 miles (b)
 Underestimate, both 33.5 and 52 were rounded down*

/ 2

- 36 Isla uses a calculator to work out the value of

$$\frac{603.3}{17.1 + 3.5^2}$$

Isla's answer is 21.

Emma's answer is 2.1.

One of the answers is correct.

Use approximations to find out which answer is correct.

*round to 1 s.f.: $600 \div (20 + 4^2) = 600 \div (20 + 16) = 600 \div 36 = 16.7$ (to 1 d.p.)
 this is close to 21*

Isla, answer 21

/ 2

- 37 Michael uses a calculator to work out $(621 \times 1.76) \div 27$
 Michael's answer is 40.
 Gary's answer is 400.
 One of the answers is correct.
 Use approximations to find out which answer is correct.

estimate = $600 \times 2 \div 30 = 40$, which is close to 40

Michael, answer 40

2 / 2

- 38 A school buys one calculator for each of the 144 students in Year 11.
 (a) Each calculator costs £2.33. Work out an estimate for the total cost.
 (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

round each to 1 s.f.: $2 \times 100 = 200$

(a) £200 (b) Underestimate, both numbers were rounded down

2 / 2

- 39 A circular lawn has a radius of 42 cm.
 (a) Work out an estimate for the area of the lawn. Round every number, including π , to 1 significant figure.
 (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

*r rounds to 40 and π rounds to 3
 area $\approx 3 \times 40^2 = 4,800$
 both the radius and π were rounded down ($\pi = 3.14159\dots$ was rounded to 3), so the estimate is smaller than the true value*

(a) $4,800 \text{ cm}^2$ (b) Underestimate, both the radius and π were rounded down ($\pi = 3.14159\dots$ was rounded to 3)

3 / 3

- 40 A printer prints one page every 96 seconds.
The machine works for 8 hours each day for 355 days.
Work out an estimate for the number of pages made in total.

$$8 \text{ hours} = 28,800 \text{ seconds}$$

$$28,800 \div 100 \times 400 = 115,200$$

115,200

3 / 3

- 41 A machine uses 4.7 pence of electricity for every minute it runs.
The machine runs for 48 minutes each day.
The machine runs for 45 days.
(a) Work out an estimate for how much the electricity costs. Give your answer in pounds (£).
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

round to 1 s.f.: $5 \times 50 \times 50 = 12,500p = £125$
all three numbers were rounded up, so the
estimate is bigger than the true value

(a) £125 (b) Overestimate, all
three numbers were rounded up

3 / 3

- 42 A circle has a radius of 13 metres.
(a) Work out an estimate for the area of the circle. Round every number, including π , to 1 significant figure.
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

r rounds to 10 and π rounds to 3
area $\approx 3 \times 10^2 = 300$
both the radius and π were rounded down ($\pi = 3.14159\dots$ was rounded to 3), so the estimate is
smaller than the true value

(a) 300 m^2 (b) Underestimate, both
the radius and π were rounded down ($\pi = 3.14159\dots$ was rounded to 3)

3 / 3

- 43 A machine makes one part every 55 seconds.
The machine works for 9 hours each day for 267 days.
Work out an estimate for the number of parts made in total.

$$9 \text{ hours} = 32,400 \text{ seconds}$$

$$32,400 \div 55 \times 267 = 154,000$$

162,000

3 / 3

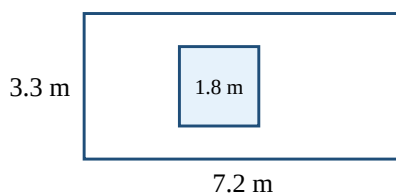
- 44 A machine uses 3.7 pence of electricity for every minute it runs.
The machine runs for 66 minutes each day.
The machine runs for 29 days.
(a) Work out an estimate for how much the electricity costs. Give your answer in pounds (£).
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

round to 1 s.f.: $4 \times 70 \times 30 = 8,400\text{p} = £84$
all three numbers were rounded up, so the
estimate is bigger than the true value

(a) £84 (b) Overestimate, all
three numbers were rounded up

3 / 3

- 45 The diagram shows a rectangle with a square cut out of it. The square is shaded.
(a) Work out an estimate for the area of the shape that is not shaded. Round each number to 1 significant figure.
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer. Diagram NOT accurately drawn.



$$7 \times 3 - 2 \times 2 = 21 - 4 = 17$$

the rectangle was rounded down and the
square that is cut out was rounded up, so
the estimate is smaller than the true value

(a) 17 m^2 (b) Underestimate, the
rectangle was rounded down and the
square that is cut out was rounded up

3 / 3

- 46 A bottling machine fills one bottle every 83 seconds.
The machine works for 7 hours each day for 227 days.
Work out an estimate for the number of bottles made in total.

$$7 \text{ hours} = 25,200 \text{ seconds}$$

$$25,200 \div 80 \times 200 = 63,000$$

63,000

3 / 3

- 47 A baby was born every 64 seconds in the UK in 2018.
Work out an estimate for the total number of babies born in the UK in 2018.
You must show how you get your answer.

$$1 \text{ year} = 365 \text{ days, } 1 \text{ day} = 24 \text{ hours, } 1 \text{ hour} = 60 \text{ minutes, } 1 \text{ minute} = 60 \text{ seconds}$$

$$\text{round to 1 s.f.: } 365 \rightarrow 400, 24 \rightarrow 20, 60, 60,$$

$$64 \rightarrow 60$$

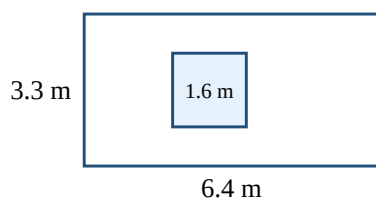
$$\text{number of seconds} = 400 \times 20 \times 60 \times 60 = 28,800,000$$

$$28,800,000 \div 60 = 480,000$$

480,000

3 / 3

- 48 The diagram shows a rectangle with a square cut out of it. The square is shaded.
(a) Work out an estimate for the area of the shape that is not shaded. Round each number to 1 significant figure.
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer. Diagram NOT accurately drawn.



$$6 \times 3 - 2 \times 2 = 18 - 4 = 14$$

the rectangle was rounded down and the square that is cut out was rounded up, so the estimate is smaller than the true value

(a) 14 m^2 (b) Underestimate, the rectangle was rounded down and the square that is cut out was rounded up

3 / 3

- 49 A car was made every 29 seconds at a factory throughout one year.
Work out an estimate for the total number of cars made at the factory in the year.
You must show how you get your answer.

*1 year = 365 days, 1 day = 24 hours, 1 hour =
60 minutes, 1 minute = 60 seconds
round to 1 s.f.: 365 → 400, 24 → 20, 60, 60,
29 → 30
number of seconds = 400 × 20 × 60 × 60 =
28,800,000
28,800,000 ÷ 30 = 960,000*

960,000

3 / 3

- 50 A new customer joined a mobile phone network every 41 seconds throughout one year.
Work out an estimate for the total number of customers who joined the network in the year.
You must show how you get your answer.

*1 year = 365 days, 1 day = 24 hours, 1 hour =
60 minutes, 1 minute = 60 seconds
round to 1 s.f.: 365 → 400, 24 → 20, 60, 60, 41
→ 40
number of seconds = 400 × 20 × 60 × 60 =
28,800,000
28,800,000 ÷ 40 = 720,000*

720,000

3 / 3