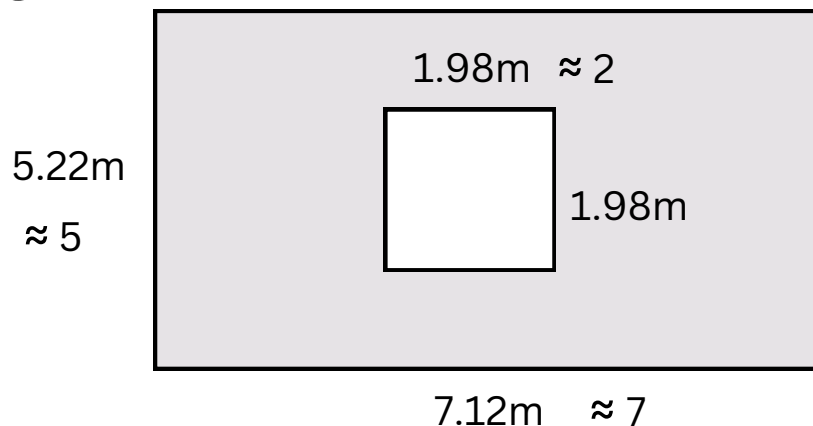


GCSE & High School Topic Questions

Estimation

Example 1

A shape is formed by cutting a square out of a rectangle.



- (a) Work out an estimate for the area of the shape.
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

Solution:

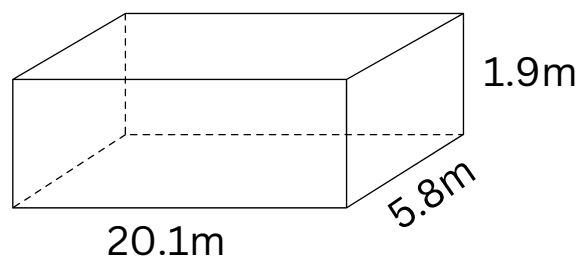
- (a) Area of big shape = $5 \times 7 = 35\text{m}^2$
Area of small shape = $2 \times 2 = 4\text{m}^2$
Area of the shape = Big shape - Small shape
Area of the shape = $35 - 4 = 31\text{m}^2$
- (b) The answer of part(a) is underestimate because the big shape will have a greater area and the small shape will have a smaller area.

GCSE & High School Topic Questions

Estimation

Example 2

Smith is going to fill an empty swimming pool. Smith fills the swimming pool with water at a constant rate of 3.2 litre per second.



Given $1\text{m}^3 = 1000$ litres,
Estimate how long it takes to fill the swimming pool. Hint: volume = $L \times W \times H$

Solution:

$$\text{Length} = 20.1\text{m} \approx 20\text{m}$$

$$\text{Width} = 5.8\text{m} \approx 6\text{m}$$

$$\text{Height} = 1.9\text{m} \approx 2\text{m}$$

$$\begin{aligned}\text{Volume} &= L \times W \times H \\ &= 20 \times 6 \times 2 \\ &= 240\text{m}^3\end{aligned}$$

since $1\text{m}^3 = 1000$ litres
so, $240\text{m}^3 = 240,000$ litres

$$\frac{240,000}{3 \times 60 \times 60} = \frac{240,000}{10800} = 22.2 = 22 \text{ hours}$$

The swimming pool will take 22h to fill .

GCSE & High School Topic Questions

Estimation

- 1 A rectangular table has a length of 9.03 metres and a width of 3.92 metres.

- (a) Work out an estimate of the area of the table.
(b) Work out an estimate of the perimeter of the table.

Hint: Area of a rectangle = $L \times W$

Perimeter of a rectangle = $4 \times L$

(4 marks)

- 2 A circle has a radius of 12 metres.

- (a) Work out an estimate for the area of the circle.
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

Hint: Area of a circle = πr^2

(4 marks)

- 3 John wants to buy some books.

He has £305 in his pocket.

Estimate how many books costing £5.95 each can he bought from £305.

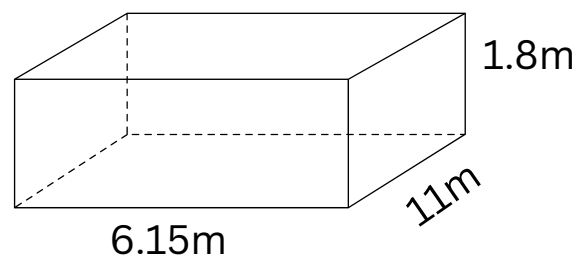
(3 marks)

GCSE & High School Topic Questions

Estimation

- 4 Richard is going to fill an empty swimming pool.

Richard fills the swimming pool with water at a constant rate of 2.1 litre per second.

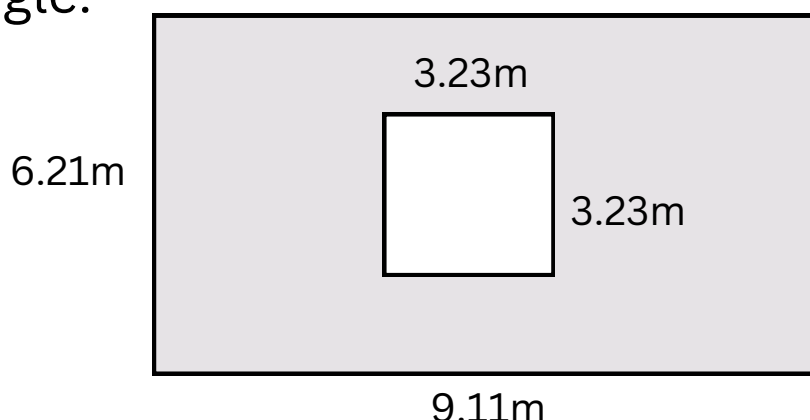


Given $1\text{m}^3 = 1000$ litres,

Estimate how long it takes to fill the swimming pool. Hint: volume = $L \times W \times H$

(4 marks)

- 5 A shape is formed by cutting a square out of a rectangle.



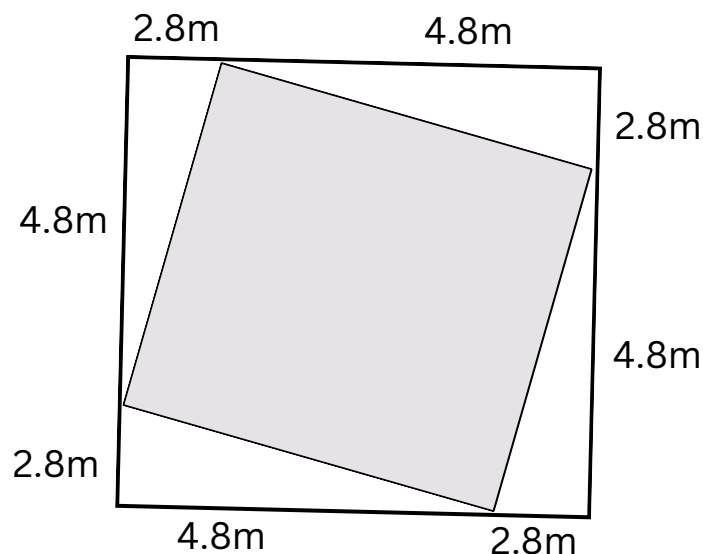
- (a) Work out an estimate for the area of the shape.
(b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

(4 marks)

GCSE & High School Topic Questions

Estimation

- 6 This diagram shows two squares.
Work out an estimate for the area of the square shown shaded in the diagram.



Hint: Subtract the area of the 4 triangles from the area of the whole square.

(4 marks)

- 7 A baby was born every 53 seconds in the UK in 2020.

(a) Work out an estimate for the total number of babies born in the UK in 2020.

You must show your working.

(b) Is your answer to part (a) an underestimate or an overestimate?

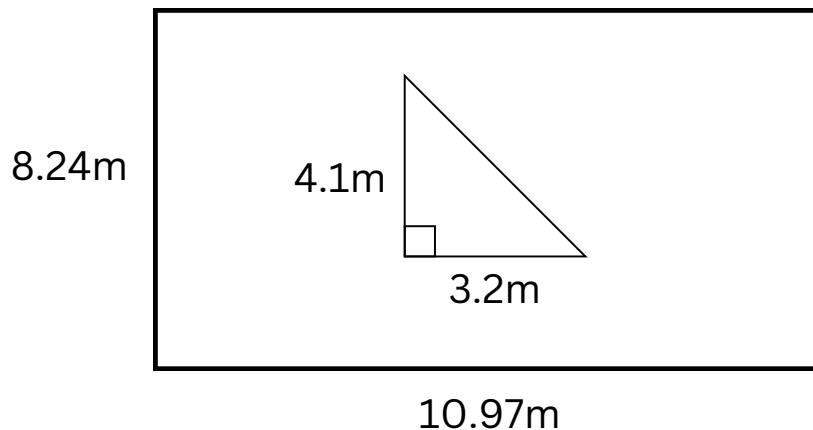
Give a reason for your answer.

(4 marks)

GCSE & High School Topic Questions

Estimation

- 8 A shape is formed by cutting a right angled triangle out of a rectangle.



- (a) Work out an estimate for the area of the shape.
 (b) Is your answer to part (a) an underestimate or an overestimate?
 Give a reason for your answer.

Hint: Area of a triangle = $\frac{1}{2} (B \times H)$

(4 marks)

GCSE & High School Topic Questions

Estimation

answers

- 1 A rectangular table has a length of 9.03 metres and a width of 3.92 metres.
- (a) Work out an estimate of the area of the table.
- (b) Work out an estimate of the perimeter of the table.

Solution: Length = 9.03m $\approx$ 9m

Width = 3.92m $\approx$ 4m

$$\begin{aligned} \text{(a): Area of the table} &= 9 \times 4 \\ &= 36\text{m}^2 \end{aligned}$$

$$\begin{aligned} \text{(b): Perimeter of the table} &= 9+9+4+4 \\ &= 26\text{m} \end{aligned}$$

- 2 A circle has a radius of 12 metres.
- (a) Work out an estimate for the area of the circle.
- (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

Solution:

$$\text{(a) radius} = 12\text{m} \approx 10\text{m}$$

$$\text{Area of the circle} = \pi r^2 \quad (\pi = 3.14\dots)$$

$$\text{Area of the circle} = \pi \times (10)^2$$

$$\text{Area of the circle} = 3 \times 100 = 300\text{m}^2$$

(b): underestimate because i rounded the pi and radius down.

GCSE & High School Topic Questions

Estimation

answers

- 3 John wants to buy some books.
He has £305 in his pocket.
Estimate how many books costing £5.95 each can he bought from £305.

Solution:

$$1 \text{ book cost} = £ 5.95 \approx £ 6$$

$$\text{He has } £ 305 \approx £ 300$$

$$300/6 = 50 \text{ books}$$

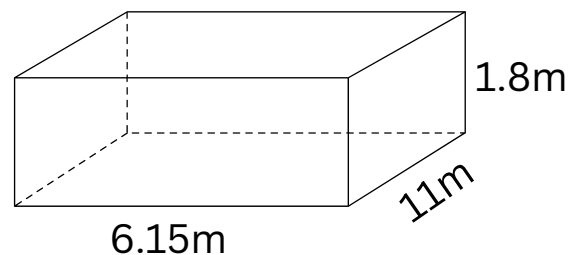
He can bought approx:50 books from £305.

GCSE & High School Topic Questions

Estimation

answers

- 4 Richard is going to fill an empty swimming pool. Richard fills the swimming pool with water at a constant rate of 2.1 litre per second.



Given $1\text{m}^3 = 1000$ litres,
Estimate how long it takes to fill the swimming pool. Hint: volume = $L \times W \times H$

Solution:

Length = $11\text{m} \approx 10\text{m}$

Width = $6.15\text{m} \approx 6\text{m}$

Height = $1.8\text{m} \approx 2\text{m}$

$$\begin{aligned}\text{Volume} &= L \times W \times H \\ &= 10 \times 6 \times 2 \\ &= 120\text{m}^3\end{aligned}$$

since $1\text{m}^3 = 1000$ litres
so, $120\text{m}^3 = 120,000$ litres

$$\frac{120,000}{2 \times 60 \times 60} = \frac{120,000}{7200} = 16.6 = 17 \text{ hours}$$

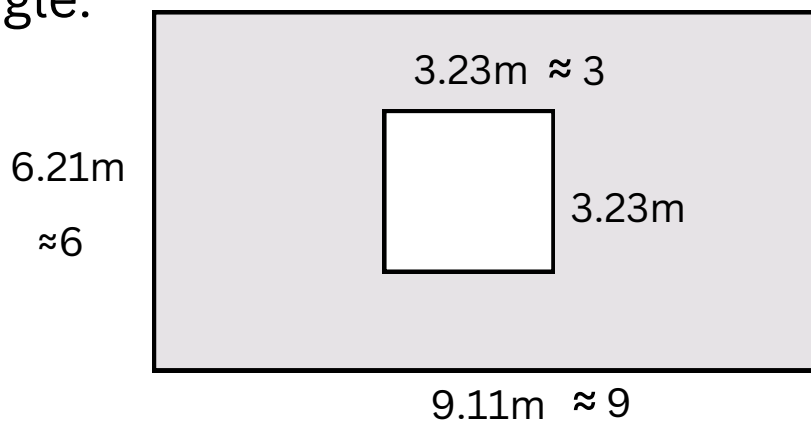
The swimming pool will take 17h to fill.

GCSE & High School Topic Questions

Estimation

answers

- 5 A shape is formed by cutting a square out of a rectangle.



- (a) Work out an estimate for the area of the shape.
 (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

Solution:

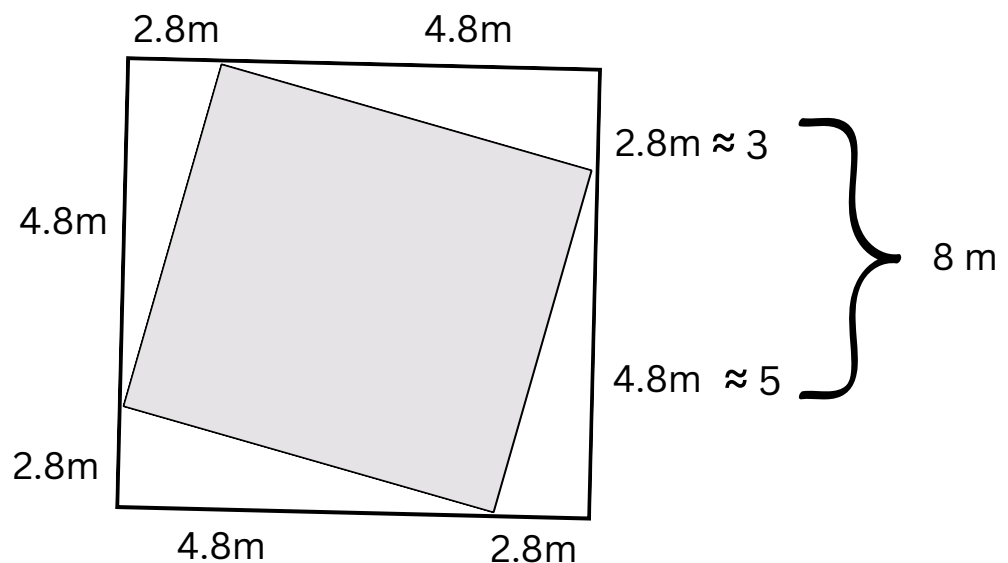
- (a) Area of big shape = $6 \times 9 = 54\text{m}^2$
 Area of small shape = $3 \times 3 = 9\text{m}^2$
 Area of the shape = Big shape - Small shape
 Area of the shape = $54 - 9 = 45\text{m}^2$
- (b) The answer of part(a) is underestimate because the big shape will have a greater area and the small shape will have a smaller area.

GCSE & High School Topic Questions

Estimation

answers

- 6 This diagram shows two squares.
Work out an estimate for the area of the square shown shaded in the diagram.



Hint: Subtract area of the 4 triangles from the area of the whole square

Solution:

$$\begin{aligned} \text{(a) Area of whole square} &= 8 \times 8 = 64\text{m}^2 \\ \text{Area of triangle} &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 5 \times 3 \\ &= \frac{15}{2} = 7.5\text{m}^2 \end{aligned}$$

$$\text{Area of four triangles} = 4 \times 7.5 = 30\text{m}^2$$

$$\begin{aligned} \text{Area of shaded square} &= \text{whole square} - 4 \text{ triangle} \\ &= 64 - 30 \\ &= 34\text{m}^2 \end{aligned}$$

GCSE & High School Topic Questions

Estimation

answers

7 A baby was born every 53 seconds in the UK in 2020.

(a) Work out an estimate for the total number of babies born in the UK in 2020.

You must show your working.

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

Solution:

(a): number of babies born in 2020 = $53 \approx 50$

number of seconds in a year = $60 \times 60 \times 24 \times 365$

$$\approx 60 \times 60 \times 20 \times 400$$

$$3600 \times 8000$$

$$\approx 4000 \times 8000$$

$$32000,000 \div 50$$

$$= 640,000$$

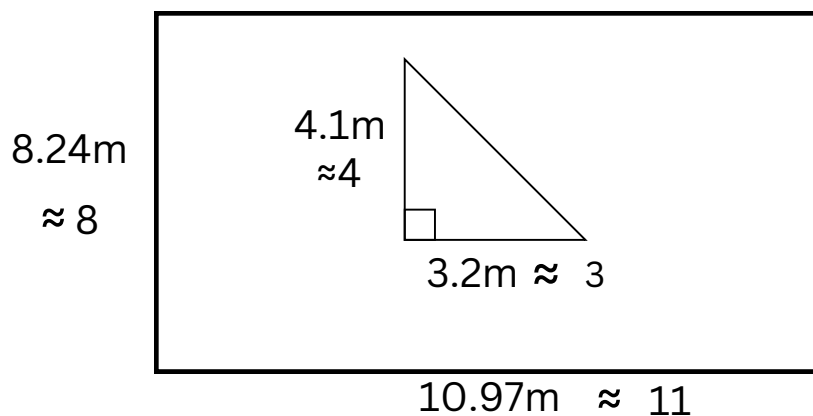
The total number of babies born in the UK in 2020 were 640,000.

GCSE & High School Topic Questions

Estimation

answers

- 8 A shape is formed by cutting a right angled triangle out of a rectangle.



- (a) Work out an estimate for the area of the shape.
 (b) Is your answer to part (a) an underestimate or an overestimate? Give a reason for your answer.

Hint: Area of a triangle = $\frac{1}{2} (B \times H)$

Solution:

$$\begin{aligned} \text{(a): Area of triangle} &= \frac{1}{2} \times (b \times h) \\ &= \frac{1}{2} \times (3 \times 4) = 6\text{m}^2 \end{aligned}$$

$$\text{Area of rectangle} = L \times B = 8 \times 11 = 88\text{m}^2$$

$$\begin{aligned} \text{Area of the shape} &= \text{rectangle's area} - \text{triangle's area} \\ &= 88 - 6 = 82\text{m}^2 \end{aligned}$$

- (b) The answer of part(a) is underestimate because the big shape will have a greater area and the small shape will have a smaller area.