

1	2	3	4	5	6	7	8	9	10	11	12	Sum

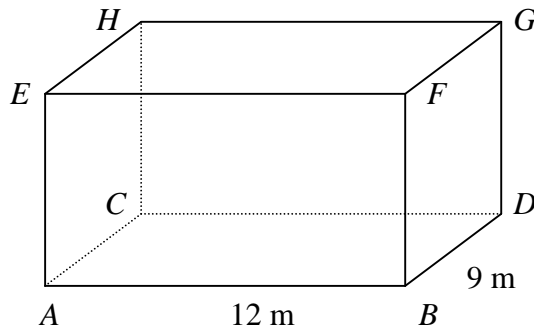
Mathematics

INSTRUCTIONS

- *Maximum marks: 34*
- *Working time: 60 minutes*
- *Number of questions: 12*
- *Number of pages: 7*
- *Don't use a calculator, please!*
- *You are advised to show all working where possible. Where an answer is wrong some marks may be given for correct method provided this is shown by written working. For the solution of can use also clean pages of paper. Please, don't forget to mark the number of the question.*

1. A room is in the shape of a cuboid. Its floor measures 12 m by 9 m and the length of BH , the diagonal of the room is 17 m. Find its volume.

2 m



Answer:

2. On a map, a road measures 1.5 cm. The actual road is 3 km long. What is the scale of the map and how long would a footpath that is 800 m long be on the map?

2 m

Answer:

3. Simplify as much as possible.

2 m

(a) $16^{\frac{1}{4}} + 2^{-2} - \left(\frac{16}{25}\right)^{-\frac{1}{2}}$

(b) $\sqrt{12} - \sqrt{27} + \sqrt{3}$

Answers: (a)

(b)

4. Solve the inequality $\frac{2x}{1-x} \leq 3$, where x is a real number.

3 m

Answer:

5. Kate is five years older than her brother. Six years ago, her brother was half her age. Find the age of each child.

3 m

Answer: _____

6. How many numbers smaller than 20 000 and divisible by 5 can be formed using the digit 0, 1, 3, 5, 7 and 9?

3 m

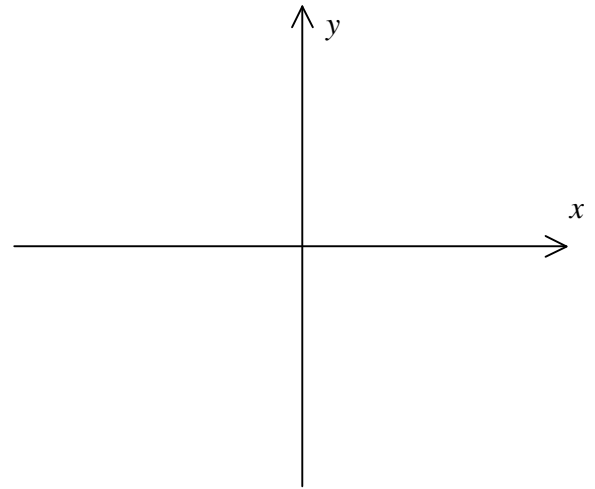
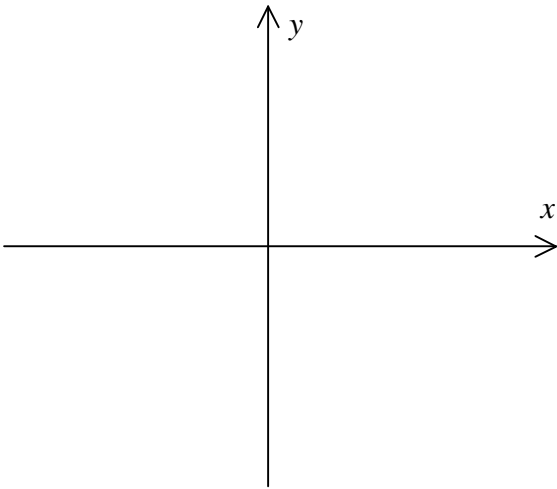
Answer:

7. Find the domain and range and of these functions, and confirm your result graphically.

4 m

(a) $y = -\frac{x}{|x|}$

(b) $y = \frac{1}{|2x-7|}$



Answers: (a) (b)

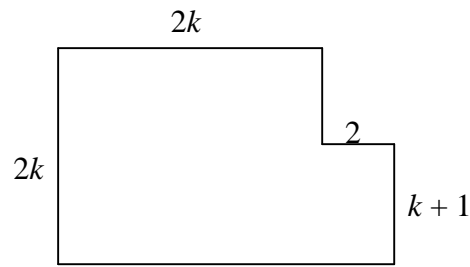
8. State whether the following statements are true or false:

3 m

- (a) $4 \in \{\text{even integers}\}$
- (b) $\{a\} \in \{a, b, c\}$
- (c) $\{\ } \subset \{3, 4, 5, 6\}$
- (d) $0 \subset \{0, 1, 2\}$
- (e) $51 \notin \{\text{prime numbers}\}$
- (f) $\{n: n \text{ is divisible by } 2, 3, \text{ and } 4\} = \{k: k \text{ is a multiple of } 24\}$

9. The diagram shows the floor plan of a room. All lengths are given in metres. An architect uses this plan to design a room with a floor area of 32 m^2 . Find the value of k .

3 m



Answer:

10. Let $f : y = \sqrt{\frac{1}{x^2}} - 2$. Find the domain and range of f .

3 m

Answer:

11. A magician asks a volunteer to think of two different positive integers without telling her what they are. She then asks him to calculate x , the sum of the larger number with the square of the smaller, and y , the difference between the numbers. The volunteer tells her that $x = 9$ and $y = 3$. Find the original numbers.

3 m

Answer:

12. Prove that $x^2 - 2px + 2p^2$ is non-negative for all real values of x .

3 m

Answer: