THIRD SPACE LEARNING

GCSE Exam Questions

Rational and Irrational Numbers | Number

GCSE Exam Questions: Rational and Irrational Numbers

1) **(a)** Show that $\sqrt{3}(4+\sqrt{3})$ is an irrational number.

(2)

(b) Show that $(\frac{1}{2}+\sqrt{3})(\frac{1}{2}-\sqrt{3})$ is a rational number.

(3)

(5 marks)

2) **(a)** The ratio of sides of a right angle triangle is equal to 5 : 12 : x.
Calculate the two possible solutions for x.

(2)

(b) The diagonal length L of a cuboid can be calculated by the formula $L = \sqrt{h^2 + w^2 + d^2}$
where h, w, and d are the values for the height, width and depth of the cuboid.
Given that $h = \sqrt{2}$, $w = \sqrt{3}$, and $d = 2$, calculate L.

(3)

(5 marks)

GCSE Exam Questions: Rational and Irrational Numbers

3) **(a)** Simplify $\frac{\sqrt{128}}{8}$

(2)

(b) Let $y > \frac{x^2}{\sqrt{5}}$. If $y = 20\sqrt{80}$, calculate the range of values for x.

(4)

(6 marks)

4) **(a)** The golden ratio is equal to $\frac{1+\sqrt{5}}{2}$. Is the golden ratio a rational or irrational number?

(1)

(b) Calculate the positive solution of x for the quadratic equation $x^2 - x - 1 = 0$.

What do you notice?

(4)

(5 marks)

GCSE Exam Questions: Rational and Irrational Numbers Answers

	Question	Answer	Marks
1) (a)	Show that $\sqrt{3}(4+)\sqrt{3}$ is an irrational number.	**(a)** $4\sqrt{3} + \sqrt{9}$ $= 4\sqrt{3} + 3$	**(1)** **(1)**
(b)	Show that $(\frac{1}{2} + \sqrt{3})(\frac{1}{2} - \sqrt{3})$ is a rational number.	**(b)** $\frac{1}{4} - \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} - 3$ $\frac{1}{4} - 3$ $-2\frac{3}{4}$	**(1)** **(1)** **(1)**
2) (a)	The ratio of sides of a right angle triangle is equal to 5:12:x. Calculate the two possible solutions for x.	**(a)** $\sqrt{12^2 + 5^2} = 13$ $\sqrt{12^2 - 5^2} = \sqrt{119}$	**(1)** **(1)**
(b)	The diagonal length L of a cuboid can be calculated by the formula $L = \sqrt{h^2 + w^2 + d^2}$ where h, w, and d are the values for the height, width and depth of the cuboid. Given that $h = \sqrt{2}$, $w = \sqrt{3}$, and $d = 2$, calculate L.	**(b)** $L = \sqrt{(\sqrt{5})^2 + (\sqrt{3})^2 + 2^2}$ $L = \sqrt{2 + 3 + 4}$ $L = \sqrt{9} = 3$	**(1)** **(1)** **(1)**
3) (a)	Simplify $\frac{\sqrt{128}}{8}$.	**(a)** $\frac{8\sqrt{2}}{8}$ $\sqrt{2}$	**(1)** **(1)**
(b)	Let $y > \frac{x^2}{\sqrt{5}}$. If $y = 20\sqrt{80}$, calculate the range of values for x.	**(b)** $20\sqrt{80} > \frac{x^2}{\sqrt{5}}$ $400 > x^2$ $0 > x^2 - 400$ $0 > (x - 20)(x + 20)$ $-20 < x < 20$	**(1)** **(1)** **(1)** **(1)**

GCSE Exam Questions: Rational and Irrational Numbers Answers

	Question	Answer	Marks
4) (a)	The golden ratio is equal to $\frac{1+\sqrt{5}}{2}$. Is the golden ratio a rational or irrational number?	**(a)** Irrational	**(1)**
(b)	Calculate the positive solution of x for the quadratic equation $x^2 - x - 1 = 0$. What do you notice?	**(b)** $x = \frac{1+\sqrt{(-1)^2 - 4 \times 1 \times -1}}{2 \times 1}$ $x = \frac{1+\sqrt{1+4}}{2}$ $x = \frac{1+\sqrt{5}}{2}$ The positive solution is the golden ratio.	**(1)** **(1)** **(1)** **(1)**

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