Name:

Exam Style Questions

Rational and Irrational Numbers

Corbettmaths

Equipment needed: Calculator, pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

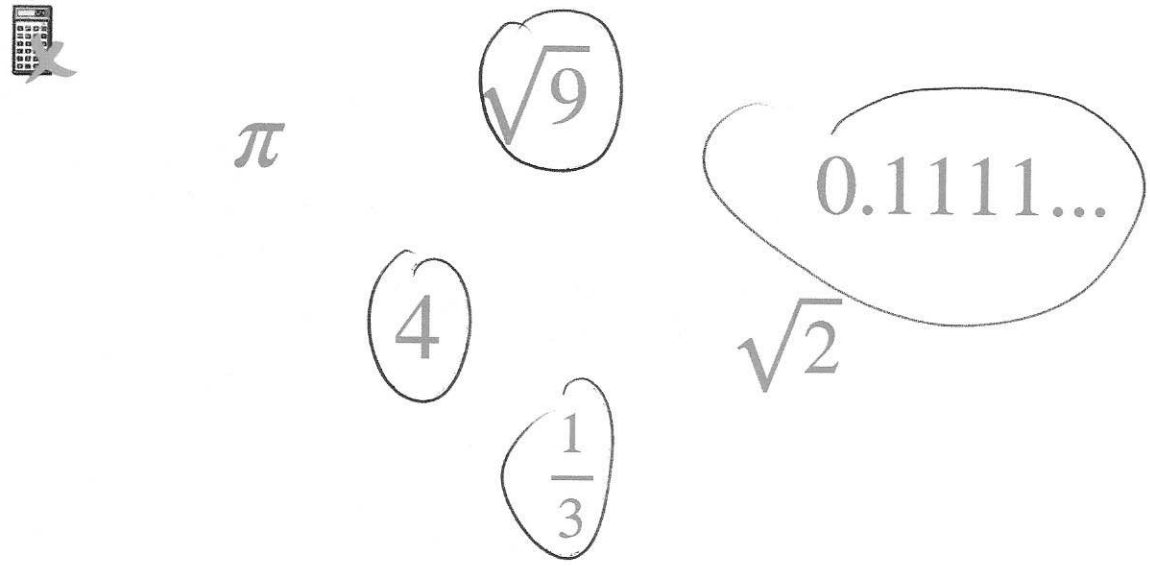
Video Tutorial

www.corbettmaths.com/contents

Video 230

Answers and Video Solutions

1. Circle the rational numbers



(2)

2. Katie says

0.6666... is irrational because it is a recurring decimal

Is Katie correct?
Explain your answer.

$0.666... = \frac{2}{3}$

Recurring decimals can be written as fractions, so they are rational.

(1)

3. Write down an irrational number.

e.g. $\frac{3}{4}$

(1)

4. Write down an irrational number.

e.g. π or $\sqrt{7}$

(1)

5. x is an irrational number between 7 and 10.
Find a value for x.

e.g. $\sqrt{50}$

3π

$\sqrt{99}$

.....

(1)

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6. y is an irrational number between 3 and 4.
Find a value for y.

$\sqrt{12}$

π

.....

(1)

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7. $\sqrt{z}$ is a rational number between $\sqrt{105}$ and $\sqrt{135}$

Find a value for z.

$\sqrt{121} = 11$

121

.....

(1)

8. Which of these equations has a rational solution?

Equation 1

$\frac{2}{3}x^2 = 26$

$\times 3 \quad \times 3$

$2x^2 = 78$

$x^2 = 39$

$x = \pm\sqrt{39}$

irrational

Equation 2

$\frac{5}{6}x^2 = 120$

$\times 6 \quad \times 6$

$5x^2 = 720$

$\div 5 \quad \div 5$

$x^2 = 144$

$x = \pm 12$

rational

Equation 3

$\frac{2}{7}x^2 = 100$

$\times 7 \quad \times 7$

$2x^2 = 700$

$x^2 = 350$

$x = \pm\sqrt{350}$

irrational

Explain your answer.

Equation 2

(2)

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9. The radius of a circle is $\frac{10}{\pi}$ cm

$r = \frac{10}{\pi}$

$d = \frac{20}{\pi}$

Is the circumference of the circle rational or irrational?
Explain your answer.

$C = \pi \times d$

$C = \pi \times \frac{20}{\pi}$

$C = 20$ cm

Rational, as the circumference is 20cm.

(3)

10.

$5x^2 = k$

The equation above can have rational or irrational solutions.

(a) Write down a value for k which gives rational solutions.

Answers include 5, 20 etc.

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(1)

(b) Write down a value for k which gives irrational solutions.

e.g. 8

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(1)

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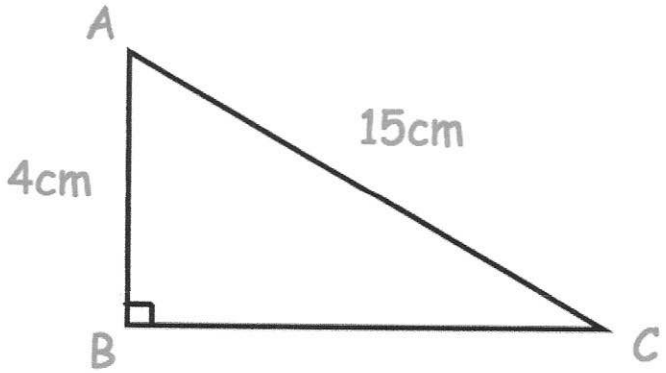
11. Shown below is right angled triangle ABC.



Is length of BC rational or irrational?
Show your working.

$4^2 + BC^2 = 15^2$

$16 + BC^2 = 225$

$BC^2 = 209$

irrational.

(3)

12. Show $(5-\sqrt{2})(5+\sqrt{2})$ is rational

$25 + 5\sqrt{2} - 5\sqrt{2} - 2$

$= 23$

QED

(3)

13. Circle the rational numbers.

$\sqrt[3]{8}$ $\quad \frac{\sqrt{8}}{\sqrt{2}} \quad \frac{\pi}{2} \quad \frac{\sqrt{15}}{\sqrt{3}}$

2 $\quad \sqrt{4} = 2 \quad \times \quad \sqrt{5}$

(2)

14. Show $\dfrac{7\sqrt{12}}{2\sqrt{3}}$ is rational

$\dfrac{7\sqrt{12}}{2\sqrt{3}} \times \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{7\sqrt{36}}{2\times 3}$

$= \dfrac{7\times 6}{6}$

$= \dfrac{42}{6} = 7.$

(3)

15. Find two different surds are multiplied together and give a rational number.

e.g. $\sqrt{3} \times \sqrt{27} = \sqrt{81} = 9$

$\sqrt{2} \times \sqrt{32}$

$\sqrt{3} \times \sqrt{12}$

.....

(2)