

Rational & Irrational

Circle the letter of the best answer.

Name _____ Date _____

1. Which of these numbers is irrational?

A) $\frac{5}{8}$ B) $\sqrt{5}$

C) 2.5

D) 0.75

Working

2. What is $\frac{3}{8}$ as a decimal?

A) 0.38

B) 3.8

C) 0.83

D) 0.375

Working

3. Where does $\sqrt{17}$ lie on the number line?

A) Between 3 and 4

B) Between 16 and 18

C) Between 4 and 5

D) Between 8 and 9

Working

4. What is 0.777... as a fraction?

A) $\frac{7}{9}$ B) $\frac{7}{99}$ C) $\frac{77}{100}$ D) $\frac{7}{10}$

Working

5. Which of these fractions has a terminating decimal expansion?

A) $\frac{5}{6}$ B) $\frac{1}{3}$ C) $\frac{2}{7}$ D) $\frac{7}{20}$

Working

6. What is the multiplicative inverse of $-\frac{2}{5}$?

A) $-\frac{2}{5}$

B) $-\frac{5}{2}$

C) $\frac{5}{2}$

D) $\frac{2}{5}$

Working

7. What is $\frac{2}{3} \div \frac{4}{9}$?

A) $\frac{3}{2}$

B) $\frac{8}{27}$

C) $\frac{27}{8}$

D) $\frac{2}{3}$

Working

8. Simplify $\sqrt{45} + \sqrt{20}$.

A) $5\sqrt{10}$

B) $\sqrt{65}$

C) $5\sqrt{5}$

D) $6\sqrt{5}$

Working

9. What is $(7 + \sqrt{3})(7 - \sqrt{3})$?

A) 52

B) $49 - \sqrt{3}$

C) 46

D) 40

Working

10. Rationalise the denominator of $\frac{5}{\sqrt{3}}$.

A) $\frac{5\sqrt{3}}{3}$

B) $5\sqrt{3}$

C) $\frac{\sqrt{3}}{5}$

D) $\frac{5}{3}$

Working

Answer key — fold under before giving this to a child

1. B 2. D 3. C 4. A 5. D 6. B 7. A 8. C 9. C 10. A

1. B) $\sqrt{5}$

$\sqrt{5} = 2.2360679\dots$ — it never ends and never repeats. The other three are all fractions in disguise.

2. D) 0.375

$3 \div 8 = 0.375$. It terminates because $8 = 2^3$, and 2 is an allowed factor.

3. C) Between 4 and 5

$4^2 = 16$ and $5^2 = 25$, and 17 sits just above 16, so $\sqrt{17} \approx 4.12$.

4. A) $7/9$

A single repeating digit d gives $d/9$. So $0.777\dots = 7/9$.

5. D) $7/20$

A fraction terminates exactly when its denominator, in lowest terms, has no prime factors except 2 and 5. $20 = 2^2 \times 5$, so $7/20 = 0.35$.

6. B) $-5/2$

Flip the fraction and keep the sign: $(-2/5) \times (-5/2) = 1$.

7. A) $3/2$

Dividing by a fraction means multiplying by its reciprocal: $2/3 \times 9/4 = 18/12 = 3/2$.

8. C) $5\sqrt{5}$

$\sqrt{45} = 3\sqrt{5}$ and $\sqrt{20} = 2\sqrt{5}$, so the sum is $5\sqrt{5}$. Roots cannot be added under one sign — that is exactly what $\sqrt{65}$ assumes.

9. C) 46

Use $(a + b)(a - b) = a^2 - b^2$: $49 - (\sqrt{3})^2 = 49 - 3 = 46$. The whole point of a conjugate pair is that squaring removes the root; 52 comes from adding the 3 instead.

10. A) $5\sqrt{3}/3$

Multiply top and bottom by $\sqrt{3}$: the bottom becomes $\sqrt{3} \times \sqrt{3} = 3$. Nothing is thrown away — $5/\sqrt{3}$ and $5\sqrt{3}/3$ are the same number, just with the surd moved upstairs.