

GRADE 8 MATHS

Integers, Rational Numbers & Operations

Complete Printable Worksheet Pack

6 Worksheets • Number-Line Reasoning • Rational Number Operations • Algebra • Real-Life Problems •
Challenge

Worksheet 1: Integers & Number-Line Reasoning

Name: _____ Date: _____

1. Arrange in ascending order: $-7, 4, -2, 0, 9, -11$.
2. Find the distance between -8 and 5 on a number line.
3. Evaluate: $-14 + 9 - 6$.
4. Evaluate: $18 - (-7) - 12$.
5. Which is greater: -3.5 or -3.8 ? Explain.
6. A temperature is -6°C in the morning and rises by 11°C . What is the new temperature?
7. Find the missing integer: $x - 15 = -4$.
8. Find the value of $-3(7 - 10)$.
9. A submarine is 125 m below sea level and rises 48 m. What is its new position relative to sea level?
10. Explain why multiplying two negative numbers gives a positive result using a pattern.

Answer Key — Worksheet 1

1. $-11, -7, -2, 0, 4, 9$.
2. 13 units.
3. -11 .
4. 13.
5. -3.5 , because it is closer to zero.
6. 5°C .
7. $x=11$.
8. 9.
9. -77 m .
10. Example pattern: $(-3)\times 3=-9$, $(-3)\times 2=-6$, $(-3)\times 1=-3$, $(-3)\times 0=0$; continuing by subtracting 3 gives $(-3)\times (-1)=3$.

Worksheet 2: Rational Numbers — Comparing & Ordering

Name: _____ Date: _____

1. Convert 0.625 to a fraction in simplest form.
2. Convert $\frac{7}{8}$ to a decimal.
3. Arrange from least to greatest: $-\frac{1}{2}$, 0.4, -0.75 , $\frac{2}{3}$.
4. Compare $-\frac{5}{6}$ and -0.8 using $<$, $>$ or $=$.
5. Find a rational number between $\frac{3}{5}$ and $\frac{2}{3}$.
6. Which is greater: $\frac{7}{9}$ or 0.77? Show reasoning.
7. Arrange: -1.25 , $-\frac{5}{4}$, -1.2 , $-\frac{6}{5}$.
8. Give three different rational numbers between -2 and -1 .
9. A number x satisfies $-\frac{3}{4} < x < -\frac{1}{2}$. Give one fraction that satisfies this.
10. Explain why rational numbers are dense on the number line.

Answer Key — Worksheet 2

1. $\frac{5}{8}$.
2. 0.875.
3. -0.75 , $-\frac{1}{2}$, 0.4 , $\frac{2}{3}$.
4. $-\frac{5}{6} > -0.8$ because $-0.833\dots$ is less than -0.8 , so this answer is actually $-\frac{5}{6} < -0.8$. Correct comparison: $-\frac{5}{6} < -0.8$.
5. Example $\frac{19}{30} \approx 0.6333$.
6. $\frac{7}{9} \approx 0.777\dots$, so $\frac{7}{9} > 0.77$.
7. $-1.25 = -\frac{5}{4}$, then $-\frac{6}{5} = -1.2$, then -1.2 is equal to $-\frac{6}{5}$; ordered: -1.25 , $-\frac{5}{4}$, $-\frac{6}{5}$, -1.2 .
8. Examples $-\frac{7}{4}$, $-\frac{3}{2}$, $-\frac{5}{4}$.
9. Example $-\frac{2}{3}$.
10. Between any two different rational numbers, another rational number can be found; for example their average.

Worksheet 3: Operations with Rational Numbers

Name: _____ Date: _____

1. Calculate: $\frac{3}{4} + \frac{5}{6}$.
2. Calculate: $\frac{7}{8} - \frac{1}{3}$.
3. Calculate: $(-\frac{2}{5}) \times (\frac{15}{4})$.
4. Calculate: $(-\frac{7}{9}) \div (\frac{14}{15})$.
5. Evaluate: $\frac{2}{3} - \frac{5}{6} + \frac{1}{2}$.
6. Evaluate: $(-\frac{3}{4})(\frac{8}{9}) + \frac{1}{3}$.
7. A recipe uses $2\frac{1}{2}$ cups of flour. You make $\frac{3}{4}$ of the recipe. How much flour is needed?
8. A debt of \$84 is reduced by $\frac{3}{7}$. How much debt remains?
9. Find x: $x/5 = -\frac{3}{4}$.
10. Simplify: $\frac{5}{6} \div (-\frac{10}{9})$.

Answer Key — Worksheet 3

1. $19/12 = 1 \frac{7}{12}$.
2. $13/24$.
3. $-3/2 = -1 \frac{1}{2}$.
4. $-5/6$.
5. $1/3$.
6. $-1/3$.
7. $15/8 = 1 \frac{7}{8}$ cups.
8. Reduced by \$36, so \$48 remains.
9. $x = -15/4 = -3 \frac{3}{4}$.
10. $-3/4$.

Worksheet 4: Properties, Expressions & Rational Values

Name: _____ Date: _____

1. Identify the property: $7(3+5)=7\times 3+7\times 5$.
2. Simplify: $-4x + 7x - 3$.
3. Simplify: $5(2x-3)-4x$.
4. Evaluate $3a-2b$ when $a=-4$ and $b=5$.
5. Simplify: $\frac{2}{3}x + \frac{1}{6}x$.
6. If $x=-\frac{3}{4}$, find $8x+5$.
7. Solve: $2x+5=-11$.
8. Solve: $3(x-2)=15$.
9. A number is multiplied by -4 and then 7 is added to give 19 . Find the number.
10. Explain why the distributive property is useful when working with negative numbers.

Answer Key — Worksheet 4

1. Distributive property.
2. $3x-3$.
3. $6x-15-4x=2x-15$.
4. $3(-4)-2(5)=-22$.
5. $5/6x$.
6. -1 .
7. $x=-8$.
8. $x=7$.
9. $-4x+7=19$, so $x=-3$.
10. It lets us distribute a factor across a sum or difference without changing the value, e.g. $-3(5-2)=-15+6$.

Worksheet 5: Rational Numbers in Real Life

Name: _____ Date: _____

1. A bank account is $-\$45.50$. A deposit of $\$72.25$ is made. What is the new balance?
2. A recipe requires $1\frac{3}{4}$ cups of milk. You have only $\frac{2}{3}$ of that amount. How much milk do you have?
3. A hiker descends 2.4 km and then climbs 1.75 km. What is the net change in elevation?
4. A temperature changes from -3.5°C to 4.2°C . By how many degrees did it rise?
5. A shop has a loss of $\$18.75$ on Monday and a profit of $\$27.50$ on Tuesday. What is the net result?
6. A tank is $\frac{5}{6}$ full. Then $\frac{1}{4}$ of the tank's capacity is used. What fraction remains?
7. A student spends $\frac{3}{8}$ of a $\$64$ gift card. How much remains?
8. A road is 12.5 km long. A cyclist completes $\frac{3}{5}$ of it. How far remains?
9. A debt of $\$240$ is paid off in 8 equal monthly payments. What rational number represents the change in the debt each month?
10. A machine's temperature falls 2.75°C each hour for 6 hours. What is the total change?

Answer Key — Worksheet 5

1. \$26.75.
2. $1\frac{1}{6}$ cups.
3. -0.65 km.
4. 7.7°C .
5. \$8.75 profit.
6. $\frac{5}{6} - \frac{1}{4} = \frac{10}{12} - \frac{3}{12} = \frac{7}{12}$.
7. Spent \$24, remaining \$40.
8. Completed 7.5 km; 5 km remains.
9. $-\$30$ per month.
10. -16.5°C .

Worksheet 6: Integers & Rational Numbers Challenge

Name: _____ Date: _____

1. Find x : $(-3/5)x = 9/10$.
2. Simplify: $1/2 - [3/4 - (-2/3)]$.
3. A number is increased by 25% and the result is -30 . What was the original number?
4. Find two rational numbers whose product is -6 and whose sum is 1 .
5. A sequence begins $-2, 4, -8, 16, \dots$. Find the next three terms and describe the rule.
6. The average of three rational numbers is -2 . Their first two values are $1/2$ and -5 . Find the third.
7. A rectangular field has length $7 \frac{1}{2}$ m and width $4 \frac{2}{3}$ m. Find its exact area.
8. Without using a calculator, decide whether $(-7/8) \div (14/15)$ is positive or negative and estimate its size.
9. Find the value of x if $|x-3|=5$. Give both solutions.
10. A student claims: "Adding a positive rational number always makes a number larger." Is this always true if the starting number is negative? Explain with an example.

Answer Key — Worksheet 6

1. $x = -3/2$.
2. $1/2 - 3/4 - 2/3 = -11/12$.
3. $1.25x = -30$, so $x = -24$.
4. 3 and -2 : product -6 , sum 1.
5. -32 , 64 , -128 ; multiply by -2 each time.
6. Total must be -6 ; third $= -6 - (1/2 - 5) = -3/2$.
7. $(15/2)(14/3) = 35 \text{ m}^2$.
8. Negative; exact value is $-5/6$, so magnitude is about 0.83.
9. $x = 8$ or $x = -2$.
10. No. Example $-10 + 3 = -7$, which is larger, but $-2 + 1 = -1$; adding a positive always increases the value. The statement is true for any real starting number, although the result may remain negative.