

MCR3U Diagnostic

Name: _____

Operations with Integers

1. Evaluate

a) $-10 + (-12)$

b) $(-11) + (-4) + 12 + (-7) + 18$

c) $(-6) \times 9 \div 3$

d) $\frac{20 + (-12) \div (-3)}{(-4 + 12) \div (-2)}$

2. Which choice would make each statement true: $<$, $>$, $=$?

a) $4 - 6 + 6 - 8$ _____ $-3 - 5 - (-7) - 4$

b) $5 - 13 + 7 - 2$ _____ $4 - 5 - (-3) - 5$

3. Evaluate

a) $(-3)^2 - (-2)^2$

b) $(-16) - [(-8) \div 2]$

c) $\frac{-5 + (-3)(-6)}{(-2)^2 + (-3)}$

Operations with Rational Numbers

1. Evaluate.

a) $\frac{1}{2} - \frac{-2}{3}$

b) $-8\frac{1}{4} - \frac{-1}{-3}$

c) $\frac{4}{5} \times \frac{-20}{25}$

d) $-4\frac{1}{6} \times \left(-7\frac{3}{4}\right)$

e) $\frac{-4}{3} \div \frac{2}{-3}$

f) $\left(-2\frac{1}{3}\right) \div \left(-3\frac{1}{2}\right)$

Exponent Laws

1. Evaluate

a) 4^2

b) -3^2

c) 5^0

d) $\left(\frac{1}{2}\right)^3$

e) $5^2 - 4^2$

f) $\frac{9^8}{9^5}$

g) $(4^5)(4^2)^3$

h) $\frac{(3^2)(3^3)}{(3^4)^2}$

2. Simplify

a) $(x^2y^4)(x^3y^2)$

b) $(4u^3v^2)^2 \div (-2u^2v^3)^2$

Evaluating Algebraic Expressions and Formulas

1. Find the value of each expression for $x = -5$ and $y = -4$

a) $-4x - 2y$

b) $(3x - 4y)^2$

2. The formula for the area of a triangle is $A = \frac{1}{2}bh$. Find the area of a triangle when $b = 13.5$ cm and $h = 12.2$ cm.

3. A sphere's volume is calculated using the formula $V = \frac{4}{3}\pi r^3$. Determine the volume of a sphere with a radius of 10.5 cm.

Algebraic Expressions

1. Simplify

a) $3x + 2y - 5x - 7y$

b) $m^2n + p - (2p - 3m^2n)$

2. Expand and Simplify

a) $3x(x + 2) + 5x(x - 2)$

b) $(3x - 2)(4x + 5)$

3. Factor

a) $28x^2 - 14xy$

b) $x^2 - 9x + 20$

c) $3y^2 + 18y + 24$

Solving Linear Equations

a) $2(2r - 1) + 4 = 5(r + 1)$

b) $\frac{x}{3} + \frac{1}{2} = 0$

c) $\frac{2x+1}{3} - \frac{x+1}{4} = 3$

Quadratic Equations

1. Solve.

a) $(x - 3)(x - 2) = 0$

b) $m^2 + 2m - 15 = 0$

c) $4x^2 = 9$

- Simplifying expressions Expand and simplify.
 - $3(4t - 8) + 6(2t - 1)$
 - $7(3w - 4) - 5(5w - 3)$
 - $6(m + 3) + 2(m - 11) - 4(3m - 9)$
 - $5(3y - 4) - 2(y + 7) - (3y - 8)$
 - $4(3x^2 - 2x + 5) - 6(x^2 - 2x - 1)$
 - $6(x - y) - 2(2x + 7y) - (3x - 2y)$
 - $3(x^2 - 2xy + 2y^2) - 5(2x^2 - 2xy - y^2)$
- Solving linear equations Solve and check.
 - $2(2r - 1) + 4 = 5(r + 1)$
 - $5(x - 3) - 2x = -6$
 - $7 - 2(1 - 3x) + 16 = 8x + 11$
 - $4y - (3y - 1) - 3 + 6(y - 2) = 0$
 - $4(w - 5) - 2(w + 1) = 3(1 - w)$
 - $0 = 2(t - 6) + 8 + 4(t + 7)$
 - $4(y - 2) = 3(y + 1) + 1 - 3y$
- Solving linear equations Solve and check.
 - $\frac{x}{3} + \frac{1}{2} = 0$
 - $\frac{y - 1}{3} = 6$
 - $\frac{x}{3} - \frac{1}{2} = \frac{1}{4}$
 - $\frac{m + 2}{2} = \frac{m - 1}{3}$
 - $\frac{w + 1}{2} + \frac{w + 1}{3} = 5$
 - $\frac{2x + 1}{3} - \frac{x + 1}{4} = 3$
 - $0.4(r - 8) + 3 = 4$
 - $0.5x - 0.1(x - 3) = 4$
 - $1.5(a - 3) - 2(a - 0.5) = 10$
 - $1.2(10x - 5) - 2(4x + 7) = 8$

- Common factors Factor.
 - $7t^3 - 14t^2$
 - $36x^7 + 24x^5$
 - $4xy - 2xz + 10x$
 - $8x^3 - 16x^2 + 4x$
 - $9x^2y + 6xy - 3xy^2$
 - $10d^2b + 5ab - 15a$
- Factoring $ax^2 + bx + c$, $a = 1$ Factor.
 - $x^2 + 7x + 12$
 - $y^2 - 2y - 8$
 - $d^2 + 3d - 10$
 - $x^2 - 8x + 15$
 - $w^2 - 81$
 - $r^2 - 4t$
 - $y^2 - 10y + 25$
 - $x^2 - 3x - 40$
- Factoring $ax^2 + bx + c$, $a \neq 1$ Factor.
 - $2x^2 + 7x + 3$
 - $2x^2 - 3x + 1$
 - $3t^2 - 11t - 20$
 - $2y^2 - 7y + 5$
 - $6x^2 + x - 1$
 - $4x^2 + 12x + 9$
 - $9a^2 - 16$
 - $6s^2 - 7s - 3$
 - $2u^2 + 7u + 6$
 - $9x^2 - 6x + 1$
 - $3x^2 + 7x - 20$
 - $4v^2 + 10v$
- Solving quadratic equations by factoring Solve by factoring. Check your solutions.
 - $x^2 - x - 2 = 0$
 - $y^2 - 9 = 0$
 - $n^2 - 7n = 0$
 - $x^2 - 4x = -4$
 - $6x + 8 = -x^2$
 - $x^2 + 12 = -x$
 - $2x^2 - 5x + 2 = 0$
 - $2y^2 + 7y + 3 = 0$
- Inequalities Graph the following integers on a number line.
 - $x > -2$
 - $x < 3$
 - $x \geq 0$
 - $x \leq -1$

Answers

24r - 30 b) -4w - 13 c) -4m + 32 d) 10y - 26
 $x^2 + 4x + 26$ f) $-x - 18y$ g) $-7x^2 + 4xy + 11y^2$ 2. a) -3
 3. d) 5 d) 2 e) 5 f) -4 g) 3 3. a) $-\frac{3}{2}$ b) 19 c) $\frac{2}{4}$ d) -8 e) 5
 7 g) 10.5 h) 9.25 i) -27 j) 7 4. a) $7t^2(1 - 2t)$ b) $12x^2(3x^2 + 2)$
 $2x(2y - z + 5)$ d) $4x(2x^2 - 4x + 1)$ e) $3xy(3x + 2 - y)$
 $5x(2ab + b - 3)$ 5. a) $(x + 3)(x + 4)$ b) $(y - 4)(y + 2)$

g) $(y - 5)^2$ h) $(x - 8)(x + 5)$ 6. a) $(x + 3)(2x + 1)$
 b) $(x - 1)(2x - 1)$ c) $(r - 5)(3r + 4)$ d) $(y - 1)(2y - 5)$
 e) $(2x + 1)(3x - 1)$ f) $(2x + 3)^2$ g) $(3a - 4)(5a + 4)$
 h) $(2s - 3)(3s + 1)$ i) $(u + 2)(2u + 3)$ j) $(3x - 1)^2$
 k) $(x + 4)(3x - 5)$ l) $2v(2v + 5)$ 7. a) 2, -1 b) 3, -3 c) 7, 0 d) 2
 e) -2, -4 f) no real roots g) 2, $\frac{1}{2}$ h) $-\frac{1}{2}$, -3