

ASSET 1

Numerical Portion and Elementary Algebra

$$1) \frac{2}{5} + \frac{3}{10}$$

$$= \left(\frac{2}{2} \right) \frac{2}{5} + \frac{3}{10}$$

$$= \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$$

B. $\frac{7}{10}$

First find a common denominator.

After the denominators are the same, add the numerators.

$$2). 7 - 2\frac{5}{8}$$

$$= \frac{7}{1} - \frac{21}{8}$$

$$= \left(\frac{8}{8} \right) \frac{7}{1} - \frac{21}{8}$$

$$= \frac{56}{8} - \frac{21}{8} = \frac{35}{8}$$

C. $4\frac{3}{8}$

Make the second term into an improper fraction by multiplying the 2 and the denominator (8) and adding the numerator (5).

Find a common denominator.

Convert the answer into a mixed number by dividing 35 by 8 and placing the remainder over 8.

$$3). 3 * \frac{5}{6}$$

$$= \frac{3}{1} * \frac{5}{6} = \frac{5}{2}$$

A. $2\frac{1}{2}$

After cross reducing, multiply across the top and across the bottom.

Convert this answer into a mixed number.

$$4) \frac{5}{6} \div \frac{2}{3}$$

$$= \frac{5}{6} * \frac{3}{2}$$

$$= \frac{5}{4} = 1.25$$

D. 1.25

Flip the second fraction, cross reduce and multiply.

Cross reduce and multiply across the top and bottom. Divide the fraction to get a decimal answer.

$$5) \frac{7}{8} - \frac{1}{3}$$

$$= \left(\frac{3}{3} \right) \frac{7}{8} - \frac{1}{3} \left(\frac{8}{8} \right)$$

$$= \frac{21}{24} - \frac{8}{24} = \frac{13}{24}$$

A. $\frac{13}{24}$

Find a common denominator.

Multiply and then subtract the fractions.

$$6) \frac{1}{3} * 5400 = \frac{5400}{3}$$

$$= 3 \overline{)5400}$$

D. \$1800

Find one third of 5400 by multiplying $\frac{1}{3} * 5400$.
Next divide 5400 by 3.

$$7) 13 - 8.765$$

$$= \begin{array}{r} 13.000 \\ - 8.765 \\ \hline 4.235 \end{array}$$

B. 4.235

First rewrite the problem and line up the decimals.

Subtract the two numbers.

$$8) 0.2 * 0.3 * 0.4$$

$$= \begin{array}{r} 0.2 \\ 0.3 \\ \times 0.4 \\ \hline 0.024 \end{array}$$

C. 0.024

Multiply the numbers, and then move the decimal three places to the left.

$$9) 15.2 + 0.026 + 0.0083$$

$$= \begin{array}{r} 15.2000 \\ 0.0260 \\ + 0.0083 \\ \hline 15.2343 \end{array}$$

A. 15.2343

Line up the decimals and add the numbers.

$$10) \frac{\$47.60}{8}$$

$$= 8 \overline{)47.60}$$

D. \$5.95

To find the money each gave, divide the money by the number of persons.

$$11) 2^5$$

$$= 2 * 2 * 2 * 2 * 2 = 32$$

B. 32

The exponent represents the number of times the number is multiplied to itself.

$$12) 5^3$$

$$= 5 * 5 * 5 = 125$$

C. 125

The exponent represents the number of times the number is multiplied to itself.

$$13) \left(\frac{3}{4}\right)^2$$

$$= \left(\frac{3}{4}\right) * \left(\frac{3}{4}\right) = \frac{9}{16}$$

C. $\frac{9}{16}$

The exponent represents the number of times the number is multiplied to itself. Multiply across the tops and bottoms.

$$14) \sqrt{81}$$

$$= \sqrt{9 * 9}$$

D. 9

A square root asks the question, "What two numbers multiplied by itself two times gives the number 81.

For every pair of numbers, take one of those numbers out from under the radical (square root).

$$15) \frac{5}{8} \text{ to a \%}$$

$$= 8 \overline{)5.000} \begin{array}{l} .625 \\ \hline \end{array}$$

C. 62.5 %

Convert the fraction into a decimal by dividing 5 by 8.

$$= 0.625 * 100 = 62.5\%$$

After this, multiply the decimal by 100.

$$16) \text{ Write } 3.2 \text{ as a percent.}$$

$$= 3.2 * 100 = 320 \%$$

B. 320 %

Multiply the decimal by 100.

$$17) 35\% \text{ of } 80$$

$$\frac{35}{100} = .35$$

$$= .35 * 80 = 28$$

A. 28

Convert the percent to a decimal and multiply by 80.

18) 13 is what percent of 20.

$$20 \overline{)13.00} \begin{array}{r} .65 \\ \end{array}$$

= .65 * 100 = 65 %

C. 65 %

Write the problem in the order it is written
 13 is (=) x(20)
 Solve for x
 $\frac{13}{20} = x$

Divide the part (13) by the whole (20).

23) $\frac{125}{35} = x$

= 35x = 875

= x = $\frac{875}{35}$

A. 25

See the previous problem for an explanation.

19) $\frac{56}{800} = x$

= 56 = 800x

= $\frac{56}{800} = x$

B. x = .07 or 7%

Set up a ratio, and cross multiply and solve for x.

Divide both sides by 800.

24) $\frac{6}{40} = \frac{9}{x}$

= 6x = 360

= x = $\frac{360}{6}$

B. 60

See problem 22 for explanation.

20) 20,400 * .08 = \$1632

= \$20400 + \$1632

= 22032

D. 22032

Multiply to find the percent increase, and then add the increase to the original value.

25) $\frac{3}{13} = \frac{x}{520}$

= 13x = 1560

= x = $\frac{1560}{13}$

C. 120

See problem 22.

21) $\frac{20}{15}$

= $\frac{20 \div 5}{15 \div 5} = \frac{4}{3}$

A. $\frac{4}{3}$

Set up a ratio of length to width.
 Reduce the fraction to simplest terms.

26) 3 = 2x + 5 - 3(x-1)

3 = 2x + 5 - 3x + 3

3 = -x + 8

3 = -x + 8

-8 = -8

= -5 = -x

= -1(-5) = -x (-1)

= 5 = x

C. 5

Isolate x on one side of the equation.
 Distribute the -3 throughout the (x-1).
 Combine like terms.
 Combine constants by subtracting 8 from both sides.

Divide by -1 to make x positive.

22) $\frac{\text{Kilometers}}{\text{Hours}}$

$\frac{310}{2.5} = x$

= 310 = 2.5x

= $\frac{310}{2.5} = x$

D. 124

Set up a ratio, and cross multiply and solve for x.

Divide both sides by 2.5.

$$27) \frac{3x}{4} - 3 = \frac{1x}{2} + 2$$

$$= 8 \left(\frac{3x}{4} - 3 = \frac{1x}{2} + 2 \right)$$

$$= 6x - 24 = 4x + 16$$

$$= 6x - 24 = 4x + 16$$

$$\begin{array}{r} -4x + 24 \quad -4x + 24 \\ \hline \end{array}$$

$$= 2x = 40$$

$$= \frac{2x}{2} = \frac{40}{2}$$

$$= x = 20$$

A. 20

Multiply by common denominator to get rid of the fractions.

Combine like terms and isolate x.

Divide both sides by 2.

$$31) 2 - 3x \leq -5 + 4x$$

$$\begin{array}{r} 2 - 3x \leq -5 + 4x \\ +5 + 3x \quad +5 + 3x \\ \hline 7 \leq 7x \end{array}$$

$$= \frac{7}{7} \leq \frac{7x}{7}$$

$$= 1 \leq x$$

E. $1 \leq x$

Combine like terms, and solve for x.

Divide both sides by 7.

$$32) 5 - \frac{1x}{2} > 4$$

$$= 5 - \frac{1x}{2} > 4$$

$$\begin{array}{r} -5 \quad -5 \\ \hline \end{array}$$

$$= -\frac{1x}{2} > -1$$

$$= -2\left(-\frac{1x}{2} > -1\right)$$

$$= x < 2$$

C. $x < 2$

Combine like terms, and solve for x.

Multiply both sides by -2. When multiplying or dividing by a negative, switch the direction of the inequality sign (<, >, ≤, ≥).

$$28) 0.9y + 3 = 0.4y + 1.5$$

$$= 0.9y + 3 = 0.4y + 1.5$$

$$\begin{array}{r} -0.4y - 3 \quad -0.4y - 3.0 \\ \hline \end{array}$$

$$0.5y = -1.5$$

$$= y = -3$$

C. -3

Combine like terms and isolate x.

Divide both sides by .05.

$$33) 4y \geq 2(12 - 2y)$$

$$= 4y \geq 24 - 4y$$

$$\begin{array}{r} +4y \quad +4y \\ \hline 8y \geq 24 \end{array}$$

$$= \frac{8y}{8} \geq \frac{24}{8}$$

$$= y \geq 3$$

B. $y \geq 3$

Distribute the 2, and then solve for y.

Divide both sides by 8.

29)

$$0.8x + 0.18 - 0.4x = 0.3(x+2)$$

$$\begin{array}{r} -0.4x + 0.18 \quad = 0.3x + .06 \\ \hline \end{array}$$

$$= 0.4x + 0.18 = 0.3x + 0.06$$

$$\begin{array}{r} -0.3x - 0.18 \quad -0.3x - 0.18 \\ \hline \end{array}$$

$$= x = -0.12$$

D. -0.12

After distributing the .03, combine like terms, and solve for x.

$$30) |x - 2| \leq 6$$

$$\begin{array}{r} x - 2 \leq 6 \quad \text{or} \quad x - 2 \geq -6 \\ +2 \quad +2 \quad \quad +2 \quad +2 \\ \hline \end{array}$$

$$x \leq 8 \quad \text{or} \quad x \geq -4$$

$$= -4 \leq x \leq 8$$

E. $-4 \leq x \leq 8$

The absolute value demands that the problem be worked two ways.

$$34) (6,0)$$

$$x + y = 6$$

$$= 6 + 0 = 6 \checkmark$$

$$-2x + y = -3$$

$$= -2(6) + 0 = -3$$

$$= -12 + 0 = -3 \quad \times$$

B. No

A solution is the point at which the two lines intersect.

Plug in the x and y values, and if both equations have the same answer the point is the solution.

35) $(6x + 3y)(2x - 4y)$

$(6x + 3y)(2x - 4y)$
 $= 12x^2 - 24xy + 6xy - 12y^2$
 $= 12x^2 - 18xy - 12y^2$

B. $12x^2 - 18xy - 12y^2$

FOIL: Multiply the **F**irst two terms; the **O**utside terms; the **I**nside terms; the **L**ast terms.

Combine common terms.

36) $y[y(y+4) - 6]$

$= y[y^2 + 4y - 6]$
 $= y^3 + 4y^2 - 6y$

E. $y^3 + 4y^2 - 6y$

Follow the order of operations.

37) $(-2x^2)(x^2 + 3xy - 4y^2)$

$-2x^4 - 6x^3y + 8x^2y^2$

B.
 $-2x^4 - 6x^3y + 8x^2y^2$

Distribute the $-2x^2$ throughout the problem.

38) $15x^3y - 9x^2y^2$

$= 3x^2y(5x - 3y)$

E. $3x^2y(5x - 3y)$

Find the Greatest Common Factor (GCF). What do the two terms have in common ($3x^2y$).

Divide the problem by the GCF..

39) $3ax - 7a - 6x + 14$

$= 3ax - 6x - 7a + 14$

$= 3x(a-2) - 7(a-2)$

$= (3x-7)(a-2)$

A. $(3x-7)(a-2)$

When asked to factor a polynomial with four or more terms, group the terms and factor.

3 and 6 have more in common as do 7 and 14.

Take what is outside the parenthesis and combine it, and write one of the pair in the parenthesis.

40) $x^2 - 10x + 24$

$= (x - 6)(x - 4)$

D. $(x - 6)(x - 4)$

To factor a trinomial, find the factors of 24 that add to -10.

$-6 + (-4) = -10$

The sign of the last term (+24) tells whether the signs in the parenthesis are the same or different.

$+*+ = +$ $-*+ = -$

$-*- = +$ $+*- = -$

The sign of the first term (-10x) shows the sign of the largest number in the parenthesis.

41) $4x^2 + 7x - 15$

$= 4x^2 + 12x - 5x - 15$

$= 4x(x + 3) - 5(x + 3)$

$= (4x-5)(x+3)$

A. $(4x-5)(x+3)$

First multiply the coefficient of the first term and the last term.

Which factors of this number (60) add or subtract to +7.

12 and -5 are the factors that add to seven.

Rewrite the problem and factor (see #39).

42) $2x^2 - 18$

$= 2(x^2 - 9)$

$= 2(x-3)(x+3)$

C. $2(x-3)(x+3)$

First, factor out the common factors.

(x^2-9) is a difference of squares.

43) $(\sqrt{2a^3})(\sqrt{8b^2})$

$= \sqrt{2(8)a^3b^2}$

$= \sqrt{(2)(2)(2)(2)aaabbb}$

$= 2*2*a*b\sqrt{a}$

$= 4ab\sqrt{a}$

E. $4ab\sqrt{a}$

Because the roots are the same, multiply the two terms together.

Break each term down to its prime factors and group them by twos. For every group of two, take one out from under the radical (see #14).

$$44) (\sqrt{11} + 2)(2\sqrt{11} - 1)$$

Use the FOIL method described above (see # 35).

$$2\sqrt{121} - \sqrt{11} + 4\sqrt{11} - 2$$

Take the square root of 121 and combine common terms.

$$= 2 * 11 + 3\sqrt{11} - 2$$

$$= 22 + 3\sqrt{11} - 2$$

$$= 20 + 3\sqrt{11}$$

C. $20 + 3\sqrt{11}$

$$45) \sqrt[3]{16x^4y^7}$$

Break the terms down into their prime factors and group them by 3 (this is a cube root).

$$= \sqrt[3]{\underbrace{(2)(2)(2)}_{2^3} \underbrace{(2)(2)(2)}_{2^3} \underbrace{xy^2}_{x^1y^2}}$$

$$= 2 * x * y * y \sqrt[3]{2xy}$$

$$= 2xy^2 \sqrt[3]{2xy}$$

D. $2xy^2 \sqrt[3]{2xy}$
