# Math 8-Adv

Colonial School District

Summer Math Packet
ANSWER KEY

The concepts included in this packet will help reinforce key skills your child has encountered in math this year. Please encourage them to complete as many activities as possible as it will lead to greater success next year. The answer key to this packet is available on the district website (www.colonialsd.org).

June 2019
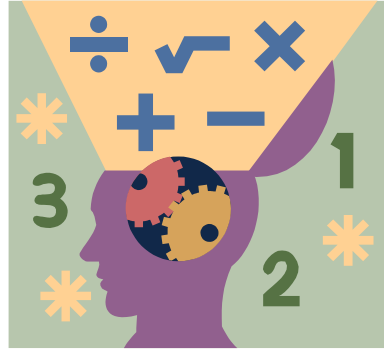
Dear Parents/Guardians,

First, we would like to thank you for all of the additional support you offer at home. Education is a true partnership between school and family that is essential to a child's success.

As this school year comes to a close, we wanted to again encourage you to continue to reinforce and foster the mathematical skills and practices that have been developed this year by scheduling time for your child to work through this summer math packet. The activities were selected by our grade level experts with the key mathematical concepts of the school year in mind. The ultimate goal is to reinforce and strengthen the skills that will serve as building blocks for future learning.

Wishing you a relaxing, yet exciting, math-filled summer!

Sincerely,

The Curriculum Department

Key

Equations

Two-step Equations

RULE	EXAMPLE
1. First, undo addition or subtraction. 2. Then, undo multiplication or division. 3. Check your answer by replacing the variable with the solution.	$3x - 2 = 13$ $\underline{+2 \quad +2}$ $\dfrac{3x}{3} \quad = \dfrac{15}{3}$ $x = 5$ ✓ $3 \times 5 - 2$ $15 - 2 = 13$

Solve.

1. $6d - 3 = 32$

$\underline{+3 \quad +3}$

$\dfrac{6d}{6} = \dfrac{35}{6}$

$d = 5\frac{5}{6}$

2. $\frac{x}{5} + 2 = 6$

$\underline{-2 \quad -2}$

$x \div 5 = 4$

$\cdot 5 \qquad \cdot 5$

$x \quad = 20$

3. $2y + 7 = 15$

$\underline{-7 \quad -7}$

$\dfrac{2y}{2} = \dfrac{8}{2}$

$y = 4$

4. $\frac{b}{7} - 13 = 23$

$\underline{+13 \quad +13}$

$7 \cdot \dfrac{b}{7} = 36 \cdot 7$

$b = 252$

5. $-5y + 9 = 24$

$\underline{-9 \quad -9}$

$\dfrac{-5y}{5} = \dfrac{15}{-5}$

$y = -3$

6. $\frac{f}{8} - 3 = -27$

$\underline{+3 \quad +3}$

$8 \cdot \dfrac{f}{8} = -24 \cdot 8$

$f = -192$

Equations

Equations with Variables on Both Sides

RULE	EXAMPLE
1. Eliminate the variable from one side of the equation using inverse operations. 2. Undo addition or subtraction. 3. Then, undo multiplication or division. 4. Check your answer by replacing the variable with the solution.	$8x - 3 = 6x + 1$ $\underline{-6x \qquad -6x}$ $2x - 3 = \qquad 1$ $\underline{+3 \qquad +3}$ $\dfrac{2x}{2} = \dfrac{4}{2}$ $x = 2$ $\checkmark \ 8 \times 2 - 3 = 6 \times 2 + 1$ $16 - 3 = 12 + 1$ $13 = 13$

Solve.

1. $3k + 10 = 2k - 21$

$\underline{-2k \qquad -2k}$

$\underline{\begin{array}{l} 1k + 10 = -21 \\ -10 \qquad -10 \end{array}}$

$k = -31$

2. $x - 4 = 6x - 19$

$\underline{-6x \qquad \downarrow -6x}$

$\underline{\begin{array}{l} -5x - 4 = -19 \\ \downarrow +4 \downarrow \qquad +4 \end{array}}$

$\dfrac{-5x}{-5} = \dfrac{-15}{-5}$

$x = 3$

3. $18 + 4p = 6p + 11$

$\underline{-6p \qquad -6p}$

$\underline{\begin{array}{l} 18 - 2p = 11 \\ -18 \qquad -18 \end{array}}$

$\dfrac{-2p}{-2} = \dfrac{-7}{-2}$

$p = 3.5$

4. $11h - 14 = 7 + 14h$

$\underline{-14h \qquad \quad -14h}$

$\underline{\begin{array}{l} -3h - 14 = 7 \\ +14 \downarrow +14 \end{array}}$

$\dfrac{-3h}{-3} = \dfrac{21}{-3}$

$h = -7$

5. $-3p + 8 = 2p - 2$

$\underline{-2p \qquad -2p}$

$\underline{\begin{array}{l} -5p + 8 = -2 \\ -8 \qquad -8 \end{array}}$

$\dfrac{-5p}{-5} = \dfrac{-10}{-5}$

$p = 2$

6. $-t + 10 = t + 4$

$\underline{-t \qquad \downarrow -t}$

$\underline{\begin{array}{l} -2t + 10 = 4 \\ -10 \quad -10 \end{array}}$

$\dfrac{-2t}{-2} = \dfrac{-6}{-2}$

$t = 3$

1. $n = 6$

Angle Sum $= 180(6-2)$
$= 180(4)$
$= \underline{\underline{720°}}$ ✓

2. $\bar{n} = 8$

Angle Sum $= 180(8-2)$
$= 180(6)$
$= 1080°$

One Angle $= \dfrac{1080°}{8} = \underline{\underline{135°}}$ ✓

3.   Angle Sum $= 180(n-2)$
$720 = 180(n-2)$
$4 = n - 2$ ✓
$6 = n$

4. $n = 23$

Angle Sum $= 180(23-2)$
$= 180(21)$
$= \underline{\underline{3780°}}$ ✓

5. $n = 14$

　　Angle. Sum $= 180(14 - 2)$
　　　　　　　$= 180(12)$
　　　　　　　$= \underline{\underline{2160°}}$ ✓

6. Angle Sum $= 180(n - 2)$
　　　$1980 = 180(n - 2)$
　　$\div 180$ 　　　　$\div 180$
　　　――――――――――――――
　　　　$11 = n - 2$ ✓
　　　　$+2$ 　　　$+ 2$
　　　――――――――――――――
　　　　$\underline{\underline{13 = n}}$

7. $n = 9$

　　Angle Sum $= 180(9 - 2)$
　　　　　　$= 180(7)$
　　　　　　$= \underline{\underline{1260°}}$ ✓

8. $n = 12$

　　Angle Sum $= 180(12 - 2)$
　　　　　　$= 180(10)$
　　　　　　$= 1800°$ ✓
　　One Angle $= \dfrac{1800°}{12} = \underline{\underline{150°}}$

Reteaching Worksheet 7-5

Solving Multi-Step Equations

When an equation includes parentheses, you often must first simplify the equation before you can solve it. Compare these examples.

$$4(x - 6) = -44 + 3x$$
$$4x - 24 = -44 + 3x$$
$$4x = -20 + 3x$$
$$x = -20$$

$$3(2x - 5x) = x + 45$$
$$3(-3x) = x + 45$$
$$-9x = x + 45$$
$$-10x = 45$$
$$x = -4.5$$

Note: There are multiple possibilities in the steps to solve these equations though final answer are the same.

1. Check the left example.

2. Check the right example.

3. Compare the first step in the two examples. What operations are used?

Left: Distributive Prop (multiply by 4)
Right: Subtraction
Simplified the equation

4. In the left example, what happens if you first divide both sides by 4?

$$x - 6 = -11 + \tfrac{3}{4}x$$

Solve each equation. Check your solution.

5. $6(4x - x) = -36$
$24x - 6x = -36$
$18x = -36$
$x = -2$

6. $6(4x - x) = 12x - 36$
or
$6(3x) = 12x - 36$

6.
$24x - 6x = 12x - 36$
$18x = 12x - 36$
$6x = -36$
$x = -6$

7. $-2(-3x + 6x) = 30$
$-2(3x) = 30$
$-6x = 30$
$x = -5$

8. $-2(-3x + 6x) = 30 - x$
$-2(3x) = 30 - x$
$-6x = 30 - x$
$-5x = 30$
$x = -6$

9. $-8(x - 20) = -96$

9. $-8x + 160 = -96$
$-8x = -256$
$x = 32$

10. $-8(x - 20) = -96 - 4x$
$-8x + 160 = -96 - 4x$
$-4x + 160 = -96$

10.
$-4x = -256$
$x = 64$

11. $\dfrac{75}{5} = \dfrac{5(-4 + 2x)}{5}$
$15 = -4 + 2x$

11. $19 = 2x$
$9\tfrac{1}{2} = x$

12. $75 - 9x = 5(-4 + 2x)$
$75 - 9x = -20 + 10x$
$-19x = -95$
$x = 5$

13. $2.5 = -0.5(x - 1.5)$
$2.5 = -.5x + .75$
$1.75 = -.5x$
$-3.5 = x$

14. $2x + 2.5 = -0.5(x - 1.5)$
$2x + 2.5 = -.5x + .75$
$2.5x = -1.75$
$x = -0.7$

Reteaching Worksheet 3-7

Solving Inequalities: Adding and Subtracting

An inequality is a mathematical sentence that contains one of these symbols: $<$, $>$, $\leq$, $\geq$, or $\neq$. The meaning of each of these symbols is given in the table at the right.

Symbol	Meaning
$<$	is less than
$>$	is greater than
$\leq$	is less than or equal to
$\geq$	is greater than or equal to
$\neq$	is not equal to

The same steps used to solve equations are used to solve inequalities.

Example: Solve the inequality $x + 6 > 11$.

$$x + 6 > 11$$
$$x + 6 - 6 > 11 - 6 \quad \text{Subtract 6 from each side.}$$
$$x > 5$$

Check: To check the solution, replace x with any number greater than 5. For example, use 8.

$$x + 6 > 11$$
$$8 + 6 \overset{?}{>} 11$$
$$14 > 11 \ \checkmark$$

The solution is any number greater than 5.

Solve each Inequality. Check your solution.

1. $x + 41 < 6$
   $\quad -41 \quad -41$
   $x \quad < {}^-35$

2. $x + (-4) < 20$
   $\quad -(-4) \quad -(-4)$
   $x \quad < 24$

3. $x - 7 < -10$
   $\quad +7 \quad +7$
   $x \quad < {}^-3$

4. $x - 75 > 27$
   $\quad +75 +75$
   $x \quad > 102$

5. $x - (-5) > 21$
   $\quad +(-5) +(-5)$
   $x \quad > 16$

6. $x + 54 > -96$
   $\quad -54 \quad -54$
   $x \quad > {}^-150$

7. $x + (-12) > 20$
   $\quad -(-12) \quad -(-12)$
   $x \quad > 32$

8. $x - 104 < 75$
   $\quad +104 +104$
   $x \quad < 179$

9. $x + 7 > 15$
   $\quad -7 \quad -7$
   $x \quad > 8$

10. $x - 32 < -12$
    $\quad +32 \quad +32$
    $x \quad < 20$

11. $x - 72 > -136$
    $\quad +72 \quad +72$
    $x \quad > -64$

12. $x - (-92) < 65$
    $\quad +(-92) +(-92)$
    $x \quad < {}^-27$

Reteaching Worksheet 3-8

Solving Inequalities: Multiplying and Dividing

When you multiply or divide each side of an inequality by a positive number, you get a new inequality with the same solutions.

$$3h < -12$$
$$3h \div 3 < -12 \div 3$$
$$h < -4$$

$$\frac{h}{5} > 10$$
$$\frac{h}{5} \cdot 5 > 10 \cdot 5$$
$$h > 50$$

Note: ✗

When you multiply or divide each side by a <u>negative number</u>, you must reverse the inequality symbol. Otherwise, the new inequality will not have the same solutions. ✗

$$-3h < -12$$
$$-3h \div (-3) > -12 \div (-3)$$
$$h > 4$$

$$\frac{h}{-5} > 10$$
$$\frac{h}{-5} \cdot (-5) < 10 \cdot (-5)$$
$$h < -50$$

Do the two inequalities have the same solutions? Write yes or no.

1. $2x < 14 \rightarrow x < 7$
   $x > 7$ *No*

2. $-x < 0$ *Yes*
   $x > 0$

3. $3x < 9$ *Yes*
   $x < 3$

4. $-5x > 0$ $x < 0$ *No*
   $x > 0$

5. $-4x < 4$ *Yes*
   $x > -1$

6. $-3x > -3$ $x < 1$
   $x > 1$ *No*

Solve each inequality. Check your solution.

7. $\frac{7x}{7} < \frac{84}{7}$ $x < 12$

8. $\frac{9x}{9} > \frac{81}{9}$ $x > 9$

9. $\frac{3 \cdot h}{3} < -10 \cdot 3$
   $h < -30$

10. $\frac{6p}{6} < \frac{12}{6}$ $p < 2$

11. $\frac{4 \cdot h}{4} > -7 \cdot 4$
    $h > -28$

12. $0 > \frac{-5c}{-5}$ $0 < c$
    ✗ $\frac{0}{-5}$

13. $\frac{-2d}{-2} > \frac{4}{-2}$ $d < -2$
    ✗

14. $\frac{-2d}{-2} > \frac{-4}{-2}$
    ✗ $d < 2$

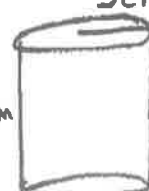15. $\frac{-2d}{-2} < \frac{-4}{-2}$ $d > 2$
    ✗

16. $\frac{-1 \cdot a}{-3} < 9 \cdot -3$
    ✗ $a > -27$

17. $\frac{-3 \cdot a}{-3} > -9 \cdot -3$
    ✗ $a < 27$
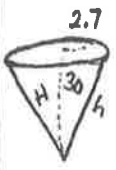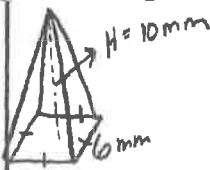
18. $\frac{3 \cdot a}{3} < -9 \cdot 3$
    $a < -27$

Directions: Draw and label a sketch of the space shape. Then, determine answer.

A right circular cone with a radius of 2.7 mm and a height of 30 mm. Find volume.	A sphere with a radius of 4 cm. Find volume.

A right circular cone with a radius of 2.7 mm and a height of 30 mm. Find volume.

$V = \frac{1}{3}\pi r^2 H$

$V = \frac{1}{3}\pi (2.7^2)(30)$ ✓

$\boxed{V = 228.906 \text{ mm}^3}$

A sphere with a radius of 4 cm. Find volume.

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi 4^3$ ✓

$\boxed{V = 267.95 \text{ cm}^3}$

A sphere with a diameter of 6 in. Find volume.

$V = \frac{4}{3}\pi R^3$

$V = \frac{4}{3}\pi 3^3$

$\boxed{V = 113.04 \text{ in}^3}$

A right circular cone with a diameter of 4 in. and a height of 20 in. Find volume.

$V = \frac{1}{3}\pi R^2 H$

$V = \frac{1}{3}\pi 2^2 (20)$

$\boxed{V = 83.7\overline{3} \text{ in}^3}$

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square pyramid with base edges of 6 mm. and a height of 10 mm. Find volume.

H=10mm
6mm

$V = \frac{1}{3}B * H$

$V = \frac{1}{3}(36) * 10$

$\boxed{V = 120 \text{ mm}^3}$

A triangular prism with base edges of 8 in. and a height of 12 in. Find the surface area and the volume.

8" 12"

$V = B * H$

$V = 27.72 (12)$

$\boxed{V = 332.64 \text{ in}^3}$

$SA = 2B + LA$

$2(27.72) + 24(12)$

$\underline{SA = 343.44 \text{ in}^2}$

$a^2 + b^2 = c^2$

$4^2 + b^2 = 8^2$

$b^2 = 48$

$b = 6.93$

$A \text{ of } \triangle = \frac{1}{2}(8)(6.93)$

$\underline{A = 27.72}$

A triangular pyramid with base edges of 8 in. and a height of 12 in. Find volume. Can you use answer from triangular prism problem as a short-cut?

Take volume ↗

$V = \frac{332.64 \text{ in}^3}{\div 3}$

12" 8"

$\boxed{V = 110.88 \text{ in}^2}$

A cylinder with 5 cm. radius on base and 10 cm. height. Find surface area and volume.

5cm
10cm

$V = \pi R^2 h$

$V = \pi (5^2)(10)$

$\boxed{V = 785 \text{ cm}^2}$

$SA = 2\pi R^2 + 2\pi R h$

$SA = 2\pi 5^2 + 2\pi 5 (10)$

$\boxed{SA = 471 \text{ cm}^2}$

Review 67   Key

1. $-3x + y = -2$

$y = \boxed{x + 6}$ sub. for y

$-3x + x + 6 = -2$

$-2x + 6 = -2$

$ -6 \quad -6$

$\dfrac{-2x}{-2} = \dfrac{-8}{-2}$

$x = 4$

$y = 10$

$(4, 10)$

2. $\boxed{y + 4} = x$ subst. for x

$-2x + y = 8$

$-2(y + 4) + y = 8$

$-2y - 8 + y = 8$

$-1y - 8 = 8$

$ +8 \quad +8$

$\dfrac{-1y}{-1} = \dfrac{16}{-1}$

$y = -16$

$x = -12$

$(-12, -16)$

3. $\boxed{y - 2} = x$ subst for x

$-x = y$

$-(y - 2) = y$

$-y + 2 = y$

$+y \qquad +y$

$\dfrac{2}{2} = \dfrac{2y}{2}$

$1 = y$

$-1 = x$

$(-1, 1)$

4. $6y + 4x = 12$

$-6x + y = -8$ solve for y

$y = \boxed{6x - 8}$ subst. for y in 1st eq.

$6(6x - 8) + 4x = 12$

$36x - 48 + 4x = 12$

$40x - 48 = 12$

$ +48 \quad +48$

$\dfrac{40x}{40} = \dfrac{60}{40}$

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

$y = 1$

$(1.5, 1)$

5. $3x + y = 5$ solve for y

$y = \boxed{5 - 3x}$ subst. for y in 2nd equation

$2x - 5y = 9$

$2x - 5(5 - 3x) = 9$

$2x - 25 + 15x = 9$

$17x - 25 = 9$

$ +25 \quad +25$

$\dfrac{17x}{17} = \dfrac{34}{17}$

$x = 2$

$y = -1$

$(2, -1)$

6. $x + 4y = -5$ Solve for x

$x = \boxed{-4y - 5}$ subst. for x in 2nd equation

$4x - 2y = 11$

$4(-4y - 5) - 2y = 11$

$-16y - 20 - 2y = 11$

$-18y - 20 = 11$

$ +20 \quad +20$

$\dfrac{-18y}{-18} = \dfrac{31}{-18}$

$y = -1\frac{13}{18}$

$x = 1\frac{8}{9}$

$\left(1\frac{8}{9}, -1\frac{13}{18}\right)$

$2y - 3x = 4$

$x = \boxed{-2}$ subst. for x

$2y - 3(-2) = 4$

$2y + 6 = 4$

$ -6 \quad -6$

$\dfrac{2y}{2} = \dfrac{-2}{2}$

$y = -1$

$(-2, -1)$

8. $3y + x = -1$

$x = \boxed{-3y}$ subst. for x

$3y + -3y = -1$

$0 = -1$

No Solution

$\emptyset$

9. $2x + y = -1$ solve for y $y = -2x - 1$

$6x = -3y - 3$ substitute for y in 2nd eq.

$6x = -3(-2x - 1) - 3$

$6x = 6x + 3 - 3$

$0 = 0$

$\mathbb{R}$ All real numbers

Name _____ *Key* _____ Date _____

Reteaching Worksheet 8-6

Graphing Equations

An equation has many ordered pairs of values that are solutions. For example, four ordered pairs for the equation $y = x - 1$ are (3, 2), (0, −1), (2, 1), and (−1, −2). There are too many to name so a picture is drawn of them. This picture is called a graph of the equation. The graph of $y = x - 1$ is the line drawn on the coordinate system at the right.
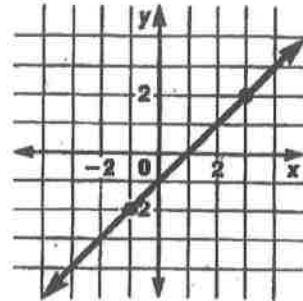
Find three ordered pairs that satisfy each equation. Graph each ordered pair. Draw a line through the points.

1. $y = x$

x	y
−2	−2
0	0
3	3
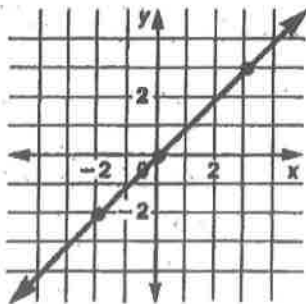
2. $y = x + 1$

x	y
−1	0
0	1
3	4
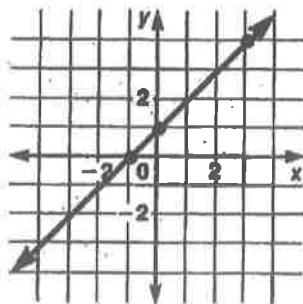
3. $y = x + 2$

x	y
0	2
1	3
2	4
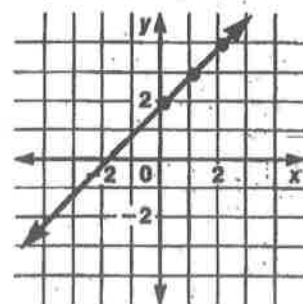
Graph each equation.

4. $y = x - 4$
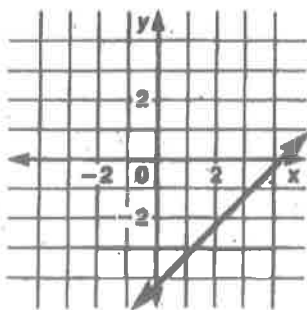
5. $y = 3x + (-5)$
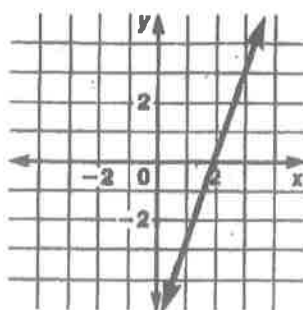
6. $y = \frac{1}{4}x$
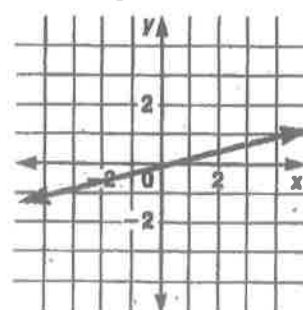
Key

One of the most famous theorems in the history of mathematics is the **Pythagorean Theorem**. It has to do with the sides of right triangles:

The Pythagorean Theorem
In any right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.

As a formula, the Pythagorean Theorem is:

$$a^2 + b^2 = c^2$$

You will often use this formula to solve problems.

leg b   hypotenuse

A

C   leg a   B

1.   What is *x*?

18 in.   *x*

24 in.
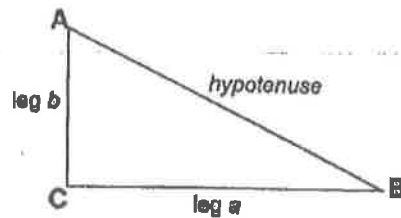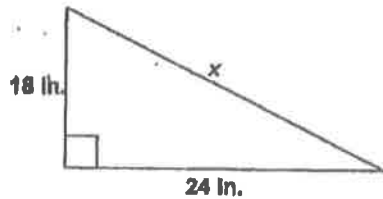
a.   12 in.
b.   30 in.
c.   36 in.
d.   40 in.

$$18^2 + 24^2 = x^2$$
$$324 + 576 = x^2$$
$$900 = x^2$$
$$\sqrt{900} = x$$
$$30 = x$$

2. What is x?

27 cm

46 cm

x
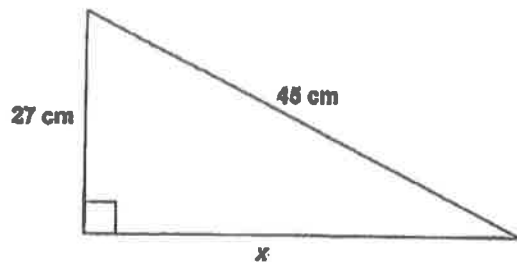
a. 20 cm
b. 25 cm
c. 28 cm
d. 36 cm

$27^2 + x^2 = 45^2$

$729 + x^2 = 2025$
$-729 \qquad -729$

$x^2 = 1296$

$x = \sqrt{1296}$

$x = 36$

3. The length and width of a rectangle are 12 m and 5 m. What is the length of the diagonal? Show your work.

$12^2 + 5^2 = x^2$

$144 + 25 = x^2$

$169 = x^2$

$\sqrt{169} = x$

$13 \, m = x$

ROTATIONAL SYMMETRY

A shape has rotational symmetry if it fits onto itself two or more times in one turn.
The order of rotational symmetry is the number of times the shape fits onto itself in one turn.
A 2D shape has a line of symmetry if the line divides the shape into two halves – one being the mirror image of the other.

Write the order of rotational symmetry under each shape & letter. Also draw dotted lines to indicate lines of symmetry.
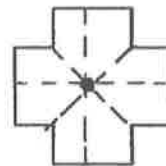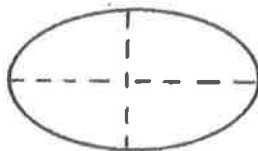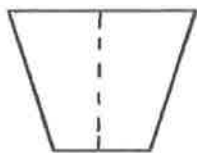
180° Rotational Sym.
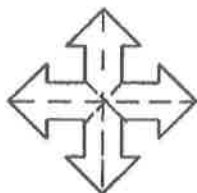
90°, 180°, 270°
Rotational Sym.
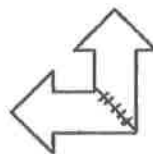
72°, 144°, 216°, 288°
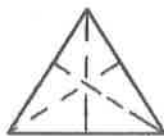
120°, 240° Rot. Sym.
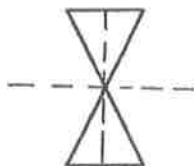
180° Rot. Sym.
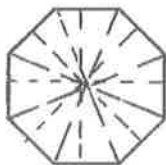
45°, 90°, 135°, 180°,
225°, 270°, 315°

72°, 144°, 216°,
288°

M A T H S

$5(2)+7\bullet 3$

$10 + 21$

31

$$\frac{5^2 - 2^4}{3}$$

$$\frac{25 - 16}{3}$$

$$\frac{9}{3} = 3$$

$$\frac{(6+8)(7-3)}{-2+3\bullet 4}$$

$$\frac{(14)(4)}{-2+12}$$

$$\frac{56}{10} = 5.6$$

$19 - 5(-2)$

$19 - (-10)$

$19 + 10$

29

$-4(5-6)+3$

$-4(-1)+3$

$4 + 3$

7

$$5^2 - 3\left(\frac{2}{3}+1\right)$$

$$25 - 3\left(1\frac{2}{3}\right)$$

$$25 - \frac{3}{1}\bullet\frac{5}{3}$$

$25 - 5$

20

The test scores for 20 students in a Spanish class are shown in the frequency table below.

Interval	Frequency
90–99	4
80–89	3
70–79	8
60–69	4
50–59	1

According to the information shown, how many students received a score greater than a 69?
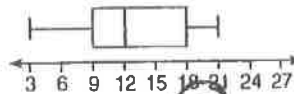
15 students

The median lies in which interval of the frequency table shown?

70-79

The upper quartile lies in which interval of the frequency table shown?

80 - 89

Which of the following sets of data values could represent the box-and-whisker plot below?

3 6 9 12 15 18-21 24 27

A) 3, 10, 11, 13, 21
B) 3, 6, 9, 12, 15, 18, 21
C) 3, 9, 10, 12,16, 18, 21
D) 3, 9, 10, 11, 13, 15, 18, 21

The accompanying histogram shows the heights of the students in Kyra's health class.
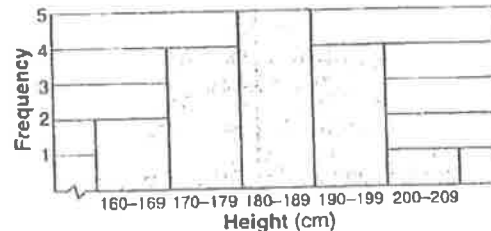
What is the total number of students in the class?
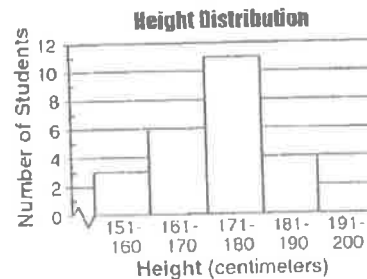
A) 15   B) 209   C) 16   D) 5

The accompanying histogram shows the height distribution for students in a high school mathematics class.

What is the total number of students in the class?
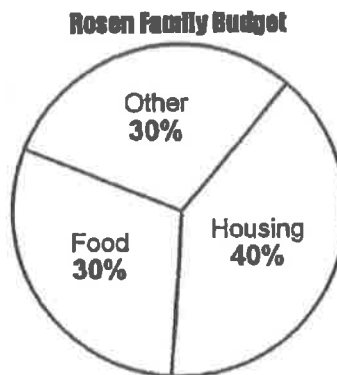
A) 28   B) 26   C) 49   D) 11

The Statistical Data Bureau published an analysis of incomes and expenditures of 100 average families throughout the United States. The circle graph below represents the Rosen family's monthly budget.

Rosen Family Budget

Other 30%

Housing 40%

Food 30%

If their total monthly income is $1,820, how much money do they spend each month on food?

A) $546   .30(1820)   B) $728   C) $606   D) $182

The accompanying graph shows the amount of water left in Rover's water dish over a period of time.

Amount of Water in Rover's Water Dish

Amount of Water (mL)

500
400
300
200
100
0

15   30   45   60   75   90   105
Time (seconds)
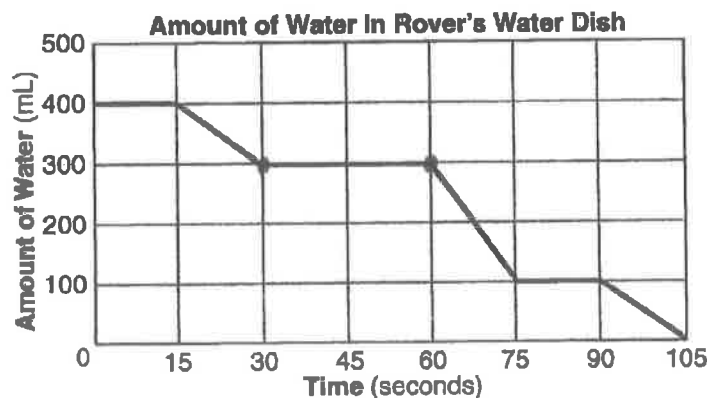
How long did Rover wait from the end of his first drink to the start of his second drink of water?

A) 60 sec   B) 30 sec   C) 10 sec   D) 75 sec

Janae's first seven French grades for the year are 91, 87, 80, 99, 85, 78, and 90. What grade is at the 75th percentile?
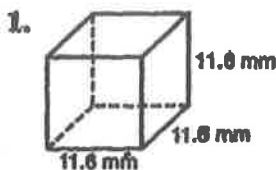
A) 90   B) 78   C) 90.5   D) 91
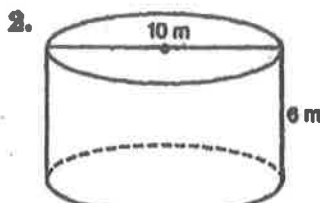
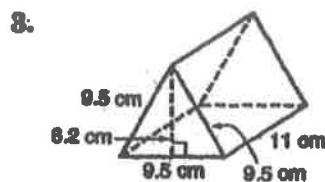78, 80, 85, 87, 90, 91, 99
↑

12-5 Practice
Surface Area: Prisms and Cylinders

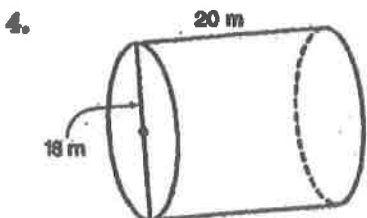**Find the surface area of each solid. Round to the nearest tenth.**

1.

11.6 mm
11.6 mm
11.6 mm

$SA = 6s^2$
$= 6(11.6)^2$
$= \boxed{807.36 \text{ mm}^2}$

2.

10 m
6 m

$SA = 2\pi r^2 + 2\pi rh$
$= 2\pi(5)^2 + 2\pi(5)(6)$
$= \boxed{345.58 \text{ m}^2}$

3.

9.5 cm
6.2 cm
11 cm
9.5 cm   9.5 cm

$SA = 2(\text{area of base}) + LA$
$= (9.5)(6.2) + 3(11 \cdot 9.5)$
$= \boxed{391.4 \text{ cm}^2}$

4.

20 m
18 m

$SA = 2\pi r^2 + 2\pi rh$
$= 2\pi(9)^2 + 2\pi(9)(20)$
$= \boxed{1639.91 \text{ m}^2}$

5.
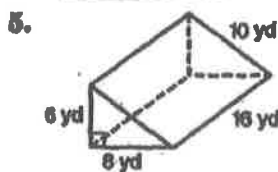
10 yd
6 yd
16 yd
8 yd

$SA = 2(\tfrac{1}{2}bh) + LA$
$= 2(\tfrac{1}{2} \cdot 6 \cdot 8) + (8 \cdot 16) + (10 \cdot 16) + (6 \cdot 16)$
$= \boxed{432 \text{ yd}^2}$

6.

8.6 m
4.7 m
3.9 m
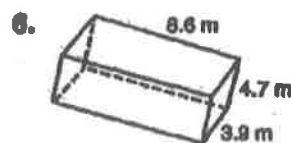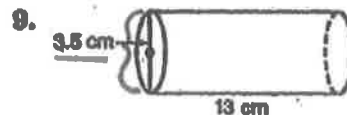
$SA = 2(\text{area of base}) + LA$
$= 2(4.7 \cdot 3.9) + 2(8.6 \cdot 4.7) + 2(8.6 \cdot 3.9)$
$= \boxed{184.58 \text{ m}^2}$

7.

8 cm
16 cm
21 cm
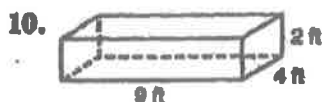14 cm   11 cm
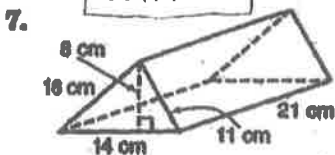
$SA = 2(\text{area of base}) + LA$
$= 2(\tfrac{1}{2} \cdot 14 \cdot 8) + (14 \cdot 21) + (11 \cdot 21) + (16 \cdot 21)$
$= \boxed{973 \text{ cm}^2}$

8.

6.1 cm
3.2 cm
2.3 cm
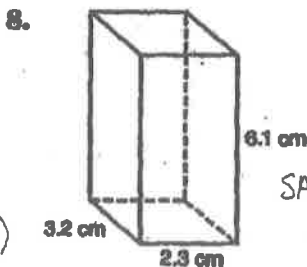
$SA = 2(\text{area of base}) + LA$
$= 2(3.2 \cdot 2.3) + 2(6.1 \cdot 2.3) + 2(3.2 \cdot 6.1)$
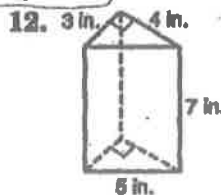$= \boxed{81.82 \text{ cm}^2}$

9.

3.5 cm
13 cm

$SA = 2\pi r^2 + 2\pi rh$
$= 2\pi(1.75)^2 + 2\pi(1.75)(13)$
$= \boxed{43.24 \text{ cm}^2}$

10.

2 ft
4 ft
9 ft

$SA = 2(\text{area of base}) + LA$
$= 2(2 \cdot 4) + 2(9 \cdot 2) + 2(9 \cdot 4)$
$= \boxed{124 \text{ ft.}^2}$

11.

20 mm
3 mm

$SA = 2\pi r^2 + 2\pi rh$
$= 2\pi(20)^2 + 2\pi(20)(3)$
$= \boxed{2890.27 \text{ mm}^2}$

12.

3 in.   4 in.
7 in.
5 in.

$SA = 2(\text{area of base}) + LA$
$= 2(\tfrac{1}{2} \cdot 3 \cdot 4) + (7 \cdot 5) + (7 \cdot 4) + (7 \cdot 3)$
$= \boxed{96 \text{ in.}^2}$

Worksheet: Exponential growth and decay

Please read all instructions carefully and box your answers.

Determine the multiplier.

1. 5% growth $= 1.05$

2. 12% decay $= .88$

3. 30% growth $= 1.3$

4. 98% decay $= .02$

5. .0017% decay $= .9983$

6. 400% growth $= 5$

7. doubling $= 2$

8. quadrupling $= 4$

Simple growth and decay

9. E. coli bacteria double in population every thirty minutes. If the initial population is 85, what's the population of bacteria after three hours? After one day?

$$\underline{3 \text{ hours} = 6 \text{ (½ hours)}}$$
$$85(2)^6$$
$$5440 \text{ bacteria}$$

$$\underline{1 \text{ day} = 48 \text{ (½ hours)}}$$
$$85(2)^{48}$$
$$2.39 \times 10^{16} \text{ bacteria}$$

10. A cup of coffee contains about 100 mg of caffeine. Every hour 16% of the amount of caffeine is metabolized and eliminated.

   a. Write an equation for C, the amount of caffeine in the body as a function of t, the number of hours since the coffee was consumed.

$$C = 100(.84)^t$$

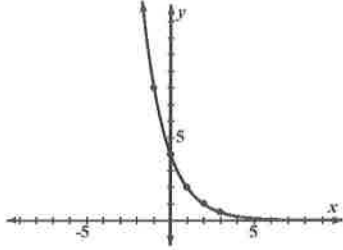   b. How much caffeine is in the body after five hours, to the nearest hundredth of a milligram? After a day?

$$100(.84)^5$$
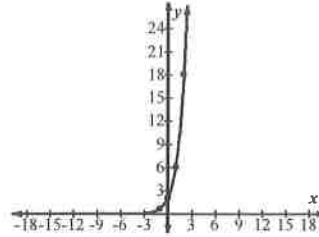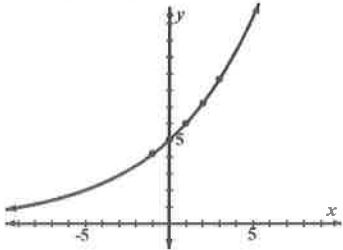$$41.82 \text{ mg}$$

EXPONENTIAL GROWTH AND DECAY
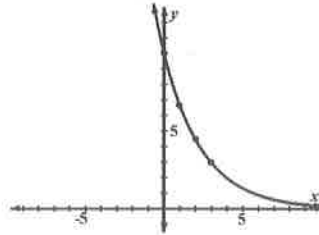
Answers

1. $y = 4\left(\frac{1}{2}\right)^x$

2. $y = 2 \cdot 3^x$

3. $y = 5(1.2)^x$

4. $y = 10\left(\frac{2}{3}\right)^x$

5. ≈ 883	6. $184,274	7. $15.84
8. $7920	9. $1.92	10. $4169
11. ≈ 5 years	12. ≈ 24 years	13. 5%, $26,600
14a. 8%, 1.08	b. $277.64	c. $55.15
15a. M: $y = 19000(.9)^x$	b.	c. about 3 years
F: $y = 11500(1.06)^x$		