

El Segundo

Grade 8 Summer Readiness Math Packet

The contents of this packet are intended to assist in students entering **MYP Math III** in El Segundo with their upcoming mathematics coursework. Just like the curriculum used by ESMS, there is a considerable amount of spiraling of the content within this packet. That is, you will notice one topic more than once within this packet. Consider completing one section per week over the summer leading up to your 8th grade math year. *There will be an assessment on this packet during the first week of school.* Do this entire packet to get a good head start on your Grade 8 coursework.

There are five sections to this packet. Each section includes a brief discussion followed by practice problems. At the end of the packet, you will find solutions to all the problem sets.

Enjoy 😊

Section 1 Discussion: Operations, Patterns, Graphing, Writing Expressions and Equations, Basic Statistics, and Proportions

- Let's review some basic vocabulary definitions. The word *sum* means the result of two or more numbers being added together while *difference* means the result of subtracting numbers from each other. In mathematics, the word *product* means the result of multiplying two or more quantities together while the word *quotient* means the result of dividing numbers. That said, let's take a look at an example.

Example:

Given the following numbers, (a) find the sum, (b) find the difference, (c) find the product, and (d) find the quotient: 9, 14

Answer:

(a) $9 + 14 = 23$

(b) $9 - 14 = -5$

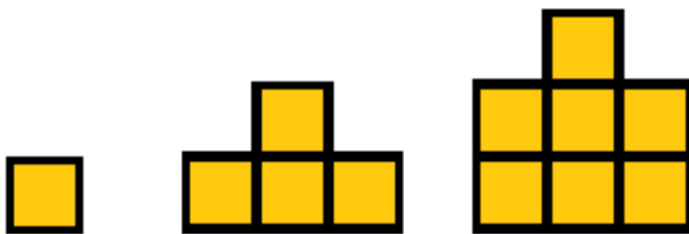
(c) $(9)(14) = 126$

(d) $\frac{9}{14}$

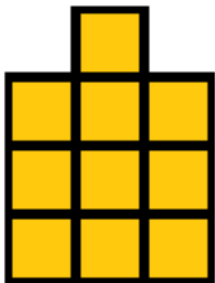
- In your previous mathematics classes, you have looked at patterns. As we observe patterns, we often want to attempt to make predictions about what may come next.

Example:

Examine the pattern below. What comes next?



Answer:

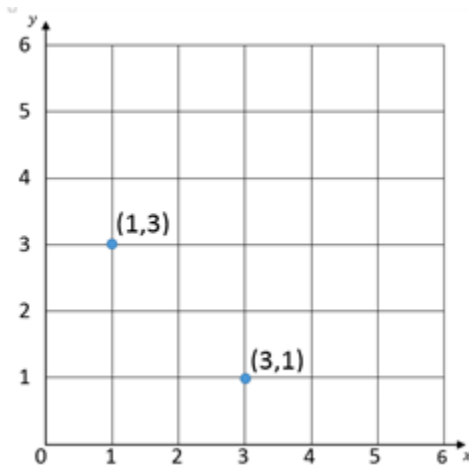


- When graphing in the first quadrant of the coordinate plane, the horizontal axis is generally the x -axis and helps us locate our position from the first coordinate of the ordered pair written in the form (x, y) . The vertical axis is typically the y -axis and we use this for our second coordinate in the ordered pair.

Example:

Plot the points $(1, 3)$ and $(3, 1)$ on the coordinate plane.

Answer:



- We often want to interpret words into mathematical statements. A common variable to use for an unknown quantity is x but any character can be used to represent such unknown amounts.

Example:

Write a mathematical statement to represent the following: the difference of 8 and an unknown quantity is 19.

Answer:

$$8 - x = 19$$

- A few of the basic statistics measures we tend to use are the mean and median of data sets. As you saw in previous math classes, the mean generally refers to the average of a data set or the calculated central value of a set of numbers. The median of a data set is the middle number in the set when the set of numbers is organized from least to greatest.

Example:

Given the data set below, find (a) the mean and (b) the median:

13, 16, 21, 19, 17, 22, 18

(a) $\frac{13+16+21+19+17+22+18}{7} = 18$

(b) Least to greatest: 13, 16, 17, **18**, 19, 21, 22; the median is 18.

- A proportion is a statement showing that two ratios are equal. We solve proportions by cross multiplying. This is when we have, for example, $\frac{a}{b} = \frac{c}{d}$ and we multiply the upper left value (a) by the lower right value (d) as well as the upper right value (c) by the lower left value (b). The result is: $ad = bc$.

Example:

Solve: $\frac{x}{4} = \frac{3}{2}$

Answer:

$$2x = 12$$

$$x = 6$$

Section 1 Problems: Operations, Patterns, Graphing, Writing Expressions and Equations, Basic Statistics, and Proportions

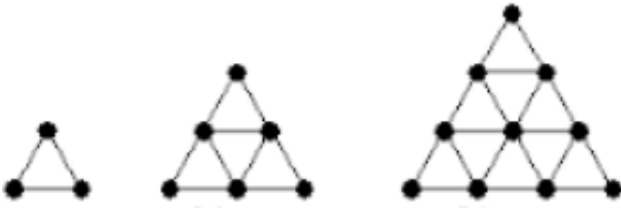
For problems 1 – 10, (a) find the sum, (b) find the difference, (c) find the product, and (d) find the quotient.

1.) 2, 3 2.) 4, 6 3.) 5, 10 4.) 10, 12 5.) 7, 9

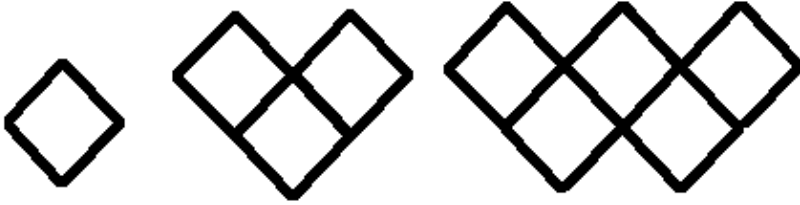
6.) 8, 16 7.) 10, 14 8.) 6, 10 9.) 12, 14 10.) 7, 11

For problems 11 – 15, find the next term in the pattern. What comes next?

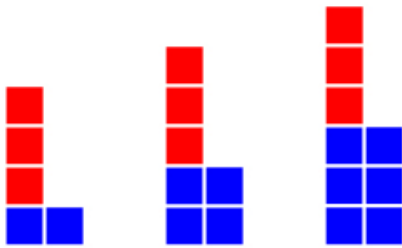
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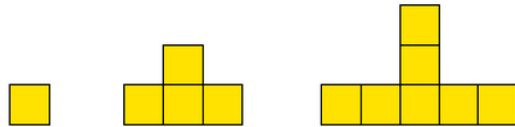
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13.)



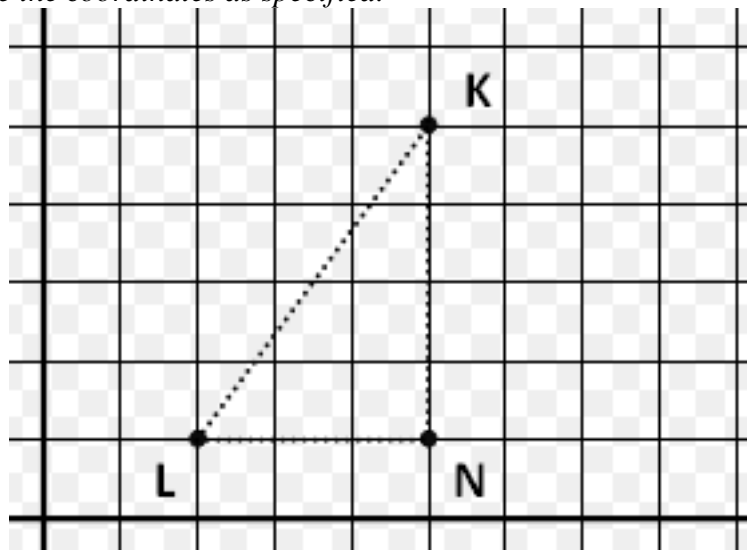
14.)



15.)



For problems 16 – 18, give the coordinates as specified.

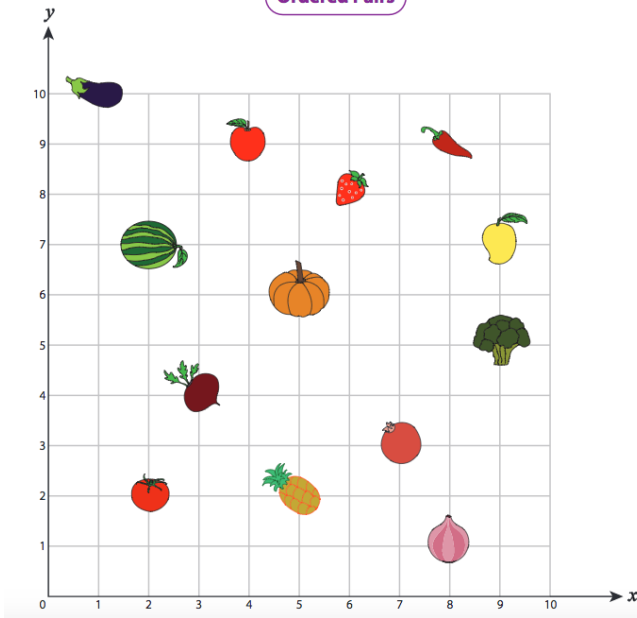


16.) Point K

17.) Point L

18.) Point N

For problems 19 – 25, examine the graph below. Answer the questions that follow.



19.) What are the coordinates of the eggplant?

20.) What are the coordinates of the watermelon?

21.) What is located at the point (3, 4)?

22.) What is located at (2, 2)?

23.) What are the coordinates of the pumpkin?

24.) What are the coordinates of the pomegranate?

25.) What is located at (9, 5)?

For problems 26 – 35, write an expression or equation for the given situation presented. Use x for the variable for each. You do NOT need to simplify the expression or solve.

26.) 4 times a number

27.) Five minus a number

28.) A number plus seven

29.) a number divided by 12

30.) Seven times a number

31.) the sum of a number and 8 equals 13.

32.) the difference of 2 and a number equals 22.

33.) 7 times a number equals 6.

34.) 14 minus a number is 24.

35.) 10 divided by a number is 30.

For problems 36 and 37, find the mean and median of the data set.

36.) 99, 88, 88, 92, 100

37.) 30, 22, 38, 41, 33, 41, 30, 24

38.) Sam's test scores on the first four math tests of the year were 88, 92, 82, and 94. What must Sam score on the fifth test so that the mean is a 90?

For problems 39 – 50, solve each.

39.) $\frac{x}{3} = \frac{5}{7}$

40.) $\frac{6}{x} = \frac{1}{2}$

41.) $\frac{2}{x} = \frac{3}{4}$

42.) $\frac{4}{5} = \frac{2}{x}$

43.) $\frac{1}{3} = \frac{x}{5}$

44.) $\frac{2}{3} = \frac{3x}{4}$

45.) $\frac{4}{7} = \frac{x}{3}$

46.) $\frac{2}{5} = \frac{3}{x}$

47.) $\frac{1}{4} = \frac{1}{5x}$

48.) $\frac{7}{8} = \frac{x}{2}$

49.) $\frac{3x}{4} = \frac{1}{2}$

50.) $\frac{x}{7} = \frac{3}{5}$

Section 2 Discussion: Perimeter, Collecting Like Terms, Comparing Quantities, Solving One-Step Equations

- Just as you saw in some of your previous courses, the perimeter of a figure is the measure of the distance around it. Check out the example for a brief review.

Example:

Find the perimeter of the triangle that has sides of length 3 feet, 4 feet, and 5 feet.

Answer:

Perimeter: $3 + 4 + 5 = 12$ feet

- In order to collect like terms, we must collect terms with the same variables and same amount of each of the variables. You have practiced this before. For instance, $2x$ and $3y$ are not like terms since $2x$ contains the variable x and $3y$ contains the variable y .

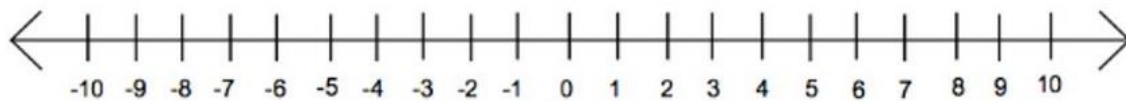
Example:

Simplify by collecting like terms: $3x + 4y + 8x - 2y$

Answer:

$(3x + 8x) + (4y - 2y) \rightarrow 11x + 2y$

- In terms of comparing quantities, we want to be able to look at numbers in all forms and determine which is greater. When doing this, consider the placement of the numbers on the number line.



Given two values, the number that appears to the right on the number line will always be the larger of the two values. Consider the following example.

Example:

Here is a number line with 0, S, and B marked.



Are the following correct? Mark your answer in the box.

- (a) B is greater than 0.
- (b) S is less than 0.
- (c) S is greater than B.
- (d) 0 is less than S.

Answer:

(a) yes (b) no (c) no (d) yes

- In order to solve equations, we generally always want to isolate a variable (i.e. the letter in the problem) to determine what value it is equivalent to. Further, once we think we have the final answer to any problem, we can substitute the variable back into the equation to ensure balance occurs in the equality.

Example:

Solve: $p - 7 = 3$

Answer:

$$\begin{array}{r}
 p - 7 = 3 \\
 \hline
 +7 \quad +7 \\
 \hline
 p = 10
 \end{array}$$

Check your answer:

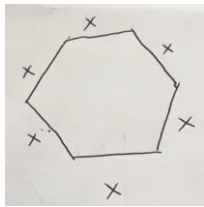
$$\begin{array}{l}
 p - 7 = 3 \\
 (10) - 7 = 3 \\
 3 = 3
 \end{array}$$

Yes! It balances!
We got the correct answer! 😊

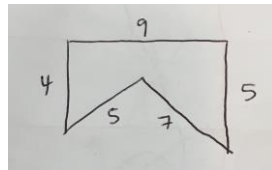
Section 2 Problems: Perimeter, Collecting Like Terms, Comparing Quantities, Solving One-Step Equations

For problems 1 – 5, find the perimeter of each figure pictured.

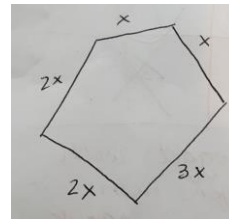
1.)



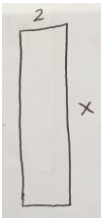
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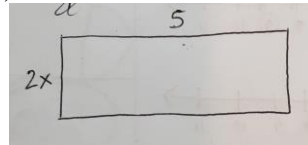
3.)



4.)



5.)



For problems 6 – 14, simplify each by collecting like terms.

6.)

$$4x + 3y - 2x + 5y$$

7.)

$$5a + 4b - 2a + 3b$$

8.)

$$8v + 7v - 2v$$

9.)

$$8w + 2x - 6w + 3x$$

10.)

$$6a + 7b - 2a + b$$

11.)

$$2x + 7x$$

12.)

$$4x + 5y - 13xy - x - 2y$$

13.)

$$4c - 5d + 3c + 2d$$

14.)

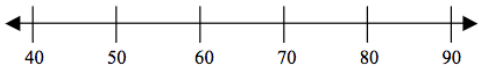
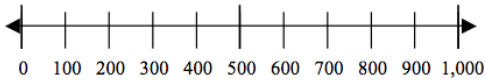
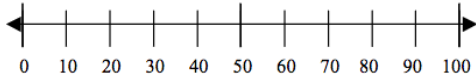
$$a + a + a + a$$

16.) Which number is larger in value: 45 or 82?

17.) Which number is lesser in value: 45 or 82?

15.)

Plot **45** and **82** on **each** of the following number lines. Put a star * by the number line that was the easiest to use.



18.) Which number is greater in value: 51 or 12?

19.) Which number is greater in value: 19 or 31?

20.) Which number is greater in value: 4 or 11?

For problems 21 – 30, solve each equation. You may check your answers by subbing in the value of the variable at the end (if you wish).

21) $-15p = 255$

22) $304 = 16n$

23) $20r = 340$

24) $-14 = k - (-1)$

25) $-19a = 285$

26) $r - (-18) = 19$

27) $p - 4 = -7$

28) $247 = -19m$

29) $-26 = -11 + v$

30) $20 - p = 26$

Section 3 Discussion: Distributing and Substituting

Example:

Find the value of the expression $3x + 1$ when $x = 2$.

Answer:

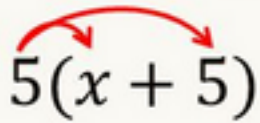
Final answer: 7

- You've practiced distributing before. Let's practice distributing some more.

Example: Multiply/distribute: $5(x + 5)$

Answer:

$$5(x + 5)$$


$$5(x + 5)$$

Distribute the 5

$$(5 \cdot x) + (5 \cdot 5)$$

$$5x + 25$$

Section 3 Problems: Distributing and Substituting

For problems 1 – 20, answer as indicated.

1.) $3x + 5$ when $x = 4$

2.) $2x - 6$ when $x = 7$

3.) $20 + 4x$ when $x = 5$

4.) $4 + x$ when $x = 31$

5.) $9y - 6$ when $y = 2$

6.) $18 + 2y$ when $y = 4$

7.) $5z$ when $z = 19$

8.) $4(x + 6)$ when $x = 8$

9.) $z + 17$ when $z = 5$

10.) $8k + 1$ when $k = 1$

11.) $x + y$ when $x = 4$ and $y = 9$

12.) $2x - y$ when $x = 10$ and $y = 9$

13.) $z - 7 + y$ when $z = 8$ and $y = 14$

14.) $3x + 2z$ when $x = 6$ and $z = 2$

15.) $4y - 8z$ when $y = 20$ and $z = 10$

16.) $x + y + z$ when $x = 4$, $y = 2$, and $z = 1$

17.) $4(x + 2y)$ when $x = 1$ and $y = 3$

18.) $5z + 6x$ when $z = 2$ and $x = 11$

19.) $2z + 1 - 4y$ when $y = 2$ and $z = 20$

20.) $h + 5k$ when $h = 12$ and $k = 4$

For problems 21 – 35, distribute/multiply.

21.) $4(x + 2)$

22.) $3(x + 8)$

23.) $4(z - 6)$

24.) $5(x + 1)$

25.) $6(y + 7)$

26.) $7(x - 4)$

27.) $8(x - 2)$

28.) $12(x + 2)$

29.) $(z + 5)^2$

30.) $4(2y + 1)$

31.) $5(3z - 1)$

32.) $2(3x + 7)$

33.) $6(2x - 6)$

34.) $7(6y + 7)$

35.) $8(2k + 5)$

Section 4 Discussion: More Solving Equations and Proportions

- Solving equations can sometimes involve multiple steps. Recall from a previous section, we want to isolate the variable (i.e. the letter) in the problem. Check out the example below and explanation.

Example:

Solve: $3b - 4 = 11$

Answer:

$$\begin{array}{r} 3b - 4 = 11 \\ +4 \quad +4 \\ \hline 3b = 15 \\ \frac{3 \cdot b}{3} = \frac{15}{3} \\ \hline b = 5 \end{array}$$

- When two fractions are set equal to each other, a good strategy is to clear the fractions in order to solve. This will often times create a one-step equation that may be perceived as more easily solvable. Check out the example below.

Example:

Solve: $\frac{9}{15} = \frac{x}{5}$

Answer:

$$\begin{array}{r} \frac{9}{15} = \frac{x}{5} \\ 5 \cdot \frac{9}{15} = \frac{x}{5} \cdot 5 \\ \hline \frac{45}{15} = x \quad \boxed{x = 3} \end{array}$$

Section 4 Problems: More Solving Equations, Proportions, and Introduction to Linear Systems

For problems 1 – 10, solve each two-step equations.

1) $5n + 5 = 45$

2) $\frac{y}{6} - 3 = -11$

3) $4(g - 1) = 24$

4) $\frac{v+9}{15} = 0$

5) $-40 = 12x + 8$

6) $-2p - 3 = -19$

7) $13 = \frac{w-14}{2}$

8) $36 = 1 + 7a$

9) $-9 = -11 + \frac{b}{8}$

10) $2q + 10 = 7q$

For problems 11 – 22, solve each.

$$11) \frac{4}{9} = \frac{2}{x}$$

$$12) \frac{6}{a} = \frac{3}{8}$$

$$13) \frac{8n}{8} = \frac{8}{3}$$

$$14) \frac{7}{9} = \frac{a}{5}$$

$$15) \frac{p}{8} = \frac{13}{2}$$

$$16) \frac{3}{13} = \frac{v}{3}$$

$$17) \frac{10}{12} = \frac{2}{n}$$

$$18) \frac{11}{10} = \frac{r}{11}$$

$$19) \frac{x}{9} = \frac{7}{14}$$

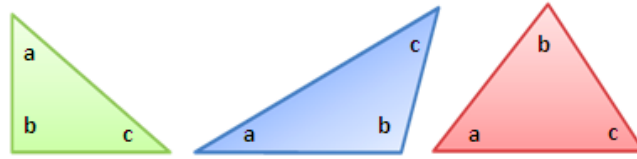
$$20) \frac{a}{10} = \frac{11}{14}$$

$$21) \frac{v}{12} = \frac{10}{2}$$

$$22) \frac{6}{14} = \frac{5}{n}$$

Section 5 Discussion: Interior Angles in Triangles

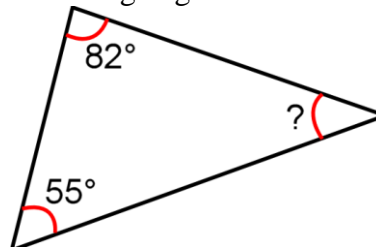
- Given any triangle, the sum (or addition) of the angles on the inside should always equal 180° .



$$a + b + c = 180^\circ$$

Example:

Find the measurement in degrees of the missing angle.



Answer:

$$? + 55^\circ + 82^\circ = 180^\circ$$

$$? + 137^\circ = 180^\circ$$

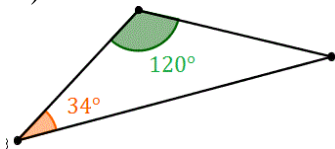
$$? = 43^\circ$$

The missing angle not listed must be 43° .

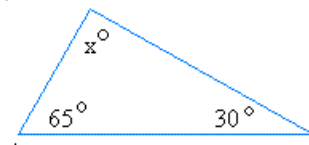
Section 5 Problems: Interior Angles in Triangles

For problems 1 – 9, find the missing angle measure in each triangle.

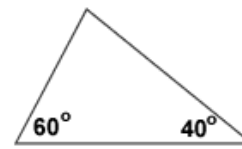
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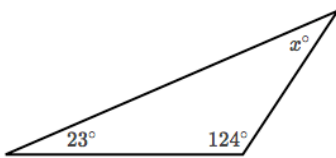
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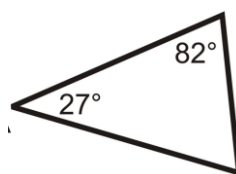
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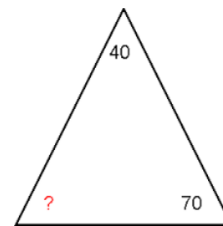
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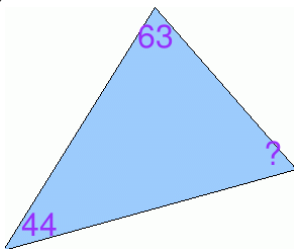
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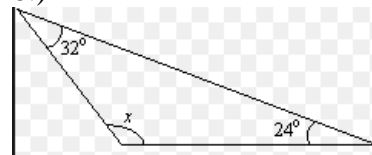
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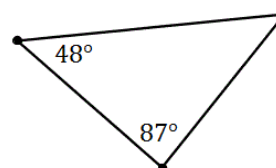
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8.)



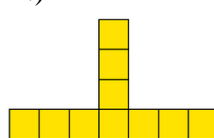
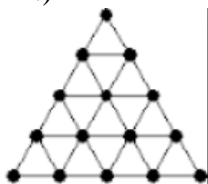
9.)



SOLUTIONS ☺

Section 1 Problems: Operations, Patterns, Graphing, Writing Expressions and Equations, Basic Statistics, and Proportions

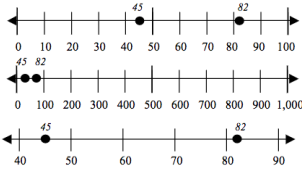
- | | | | | |
|-------------------|-------------------|-------------------|-------------------|--------------------|
| 1.) | 2.) | 3.) | 4.) | 5.) |
| (a) 5 | (a) 10 | (a) 15 | (a) 22 | (a) 16 |
| (b) -1 | (b) -2 | (b) -5 | (b) -2 | (b) -2 |
| (c) 6 | (c) 24 | (c) 50 | (c) 120 | (c) 63 |
| (d) $\frac{2}{3}$ | (d) $\frac{2}{3}$ | (d) $\frac{1}{2}$ | (d) $\frac{5}{6}$ | (d) $\frac{7}{9}$ |
| 6.) | 7.) | 8.) | 9.) | 10.) |
| (a) 24 | (a) 24 | (a) 16 | (a) 26 | (a) 18 |
| (b) -8 | (b) -4 | (b) -4 | (b) -2 | (b) -4 |
| (c) 128 | (c) 140 | (c) 60 | (c) 168 | (c) 77 |
| (d) $\frac{1}{2}$ | (d) $\frac{5}{7}$ | (d) $\frac{3}{5}$ | (d) $\frac{6}{7}$ | (d) $\frac{7}{11}$ |
| 11.) | 12.) | 13.) | 14.) | 15.) |



- | | | | | | |
|-----------------------------|---------------------------------|--------------------|--------------------|--------------------|---------------------|
| 16.) (5, 5) | 17.) (2, 1) | 18.) (5, 1) | 19.) (1, 10) | 20.) (2, 7) | |
| 21.) beet | 22.) tomato | 23.) (5, 6) | 24.) (7, 3) | 25.) broccoli | |
| 26.) 4x | 27.) 5 - x | 28.) x + 7 | 29.) x/12 | 30.) 7x | |
| 31.) x + 8 = 13 | 32.) 2 - x = 22 | 33.) 7x = 6 | | | |
| 34.) 14 - x = 24 | 35.) 10/x = 30 | | | | |
| 36.) mean: 93.4; median: 92 | 37.) mean: 32.375; median: 31.5 | 38.) 94 | | | |
| 39.) $\frac{15}{7}$ | 40.) 12 | 41.) $\frac{8}{3}$ | 42.) $\frac{5}{2}$ | 43.) $\frac{5}{3}$ | 44.) $\frac{8}{9}$ |
| 45.) $\frac{12}{7}$ | 46.) $\frac{15}{2}$ | 47.) $\frac{4}{5}$ | 48.) $\frac{7}{4}$ | 49.) $\frac{2}{3}$ | 50.) $\frac{21}{5}$ |

Section 2 Problems: Perimeter, Collecting Like Terms, Comparing Quantities, Solving One-Step Equations

- | | | | | |
|-------------|---------------------|--------------|-------------|--------------|
| 1.) 6x | 2.) 30 | 3.) 9x | 4.) 2x + 4 | 5.) 4x + 10 |
| 6.) 2x + 8y | 7.) 3a + 7b | 8.) 13v | 9.) 2w + 5x | 10.) 4a + 8b |
| 11.) 9x | 12.) 3x + 3y - 13xy | 13.) 7c - 3d | 14.) 4a | |



15.)

- 16.) 82
- 17.) 45
- 18.) 51
- 19.) 31
- 20.) 11

- 21.) -17
- 22.) 19
- 23.) 17
- 24.) -15
- 25.) -15
- 26.) 1
- 27.) -3
- 28.) -13
- 29.) -15
- 30.) -6

Section 3 Problems: Distributing and Substituting

- 1.) 17
- 2.) 8
- 3.) 40
- 4.) 35
- 5.) 12
- 6.) 26
- 7.) 95
- 8.) 56
- 9.) 22
- 10.) 9
- 11.) 13
- 12.) 11
- 13.) 15
- 14.) 22
- 15.) 0
- 16.) 7
- 17.) 28
- 18.) 76
- 19.) 33
- 20.) 32
- 21.) $4x + 8$
- 22.) $3x + 24$
- 23.) $4z - 24$
- 24.) $5x + 5$
- 25.) $6y + 42$
- 26.) $7x - 28$
- 27.) $8x - 16$
- 28.) $12x + 24$
- 29.) $2z + 10$
- 30.) $8y + 4$
- 31.) $15z - 5$
- 32.) $6x + 14$
- 33.) $12x - 36$
- 34.) $42y + 49$
- 35.) $16k + 40$

Section 4 Problems: More Solving Equations and Proportions

- 1) $5n + 5 = 45$
- 2) $\frac{y}{6} - 3 = -11$
- $n = 8$**
- $y = -48$**
- 3) $4(g - 1) = 24$
- 4) $\frac{v + 9}{15} = 0$
- $g = 7$**
- $v = -9$**
- 5) $-40 = 12x + 8$
- 6) $-2p - 3 = -19$
- $x = -4$**
- $p = 8$**
- 7) $13 = \frac{w - 14}{2}$
- 8) $36 = 1 + 7a$
- $w = 40$**
- $a = 5$**
- 9) $-9 = -11 + \frac{b}{8}$
- 10) $2q + 10 = 7q$
- $b = 16$**
- $q = 2$**

- 11.) 4.5
- 12.) 16
- 13.) 2.66
- 14.) 3.88
- 15.) 52
- 16.) 0.69
- 17.) 2.4
- 18.) 12.1
- 19.) 4.5
- 20.) 7.85
- 21.) 60
- 22.) 11.66

Section 5 Problems: Interior Angles in Triangles

- 1.) 26°
- 2.) 85°
- 3.) 80°
- 4.) 33°
- 5.) 70°
- 6.) 70°
- 7.) 73°
- 8.) 124°
- 9.) 45°