GRADE 6

REVISION

End of Year

2018-2019

PART A. General Summary

Expressions

$$2 \times 2 \times 2 = \underset{\text{base}}{2}^{\overset{\text{exponent}}{3}}$$

Order of Operations

1. Simplify the expressions inside the parentheses.
2. Find the value of all powers.
3. Multiply or divide in order from left to right.
4. Add or subtract in order from left to right.

PEMDAS

Steps for writing an algebraic expression:

Step 1: Describe the situation.

Step 2: Define a variable.

Step 3: Translate the verbal model into an algebraic expression.

Addition (+)	Subtraction (−)	Multiplication (•)	Division(÷)
sum	*difference*	*product*	*divided*
more	*less*	*times*	*quotient*
increased	*decreased*	*Twice, triple, etc.*	*ratio*

Property	Symbols	Numbers
Commutative	$a + b = b + a$ $a \bullet b = b \bullet a$	$2 + 3 = 3 + 2$ $2 \bullet 3 = 3 \bullet 2$
Associative	$(a + b) + c = a + (b + c)$ $(a \bullet b) \bullet c = a \bullet (b \bullet c)$	$(2 + 6) + 4 = 2 + (6 + 4)$ $(8 \bullet 2) \bullet 5 = 8 \bullet (2 \bullet 5)$
Identity	$a + 0 = a$ $a \bullet 1 = a$	$7 + 0 = 7$ $7 \bullet 1 = 7$

Distributive Property

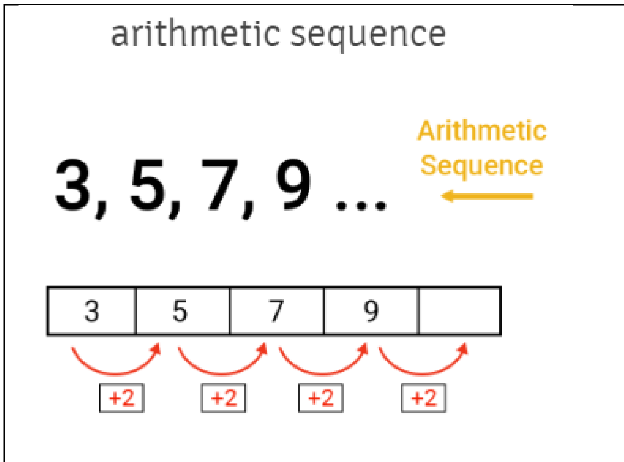
$a(b + c) = ab + ac$

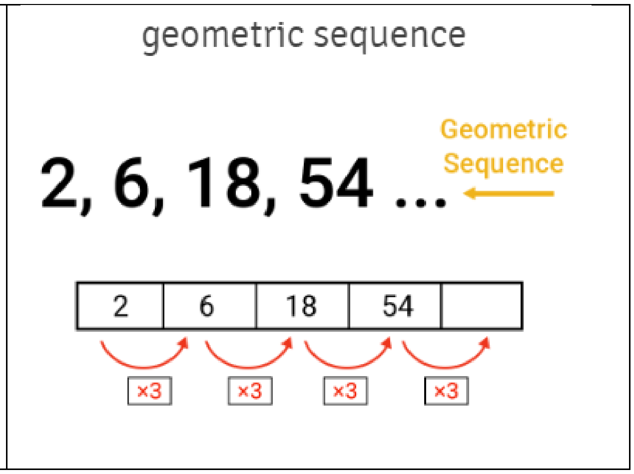
$(b + c)a = ba + ca$

Equations

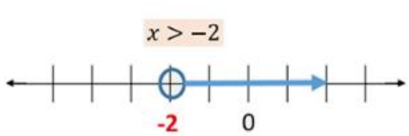
Addition Property of Equality	Subtraction Property of Equality
If you add the same number to both sides of an equation, the equation remains true.	If you subtract the same number from each side of an equation, the two sides remain equal.
Multiplication Property of Equality	**Division Property of Equality**
If you multiply both sides of an equation by the same number, the equation remains true.	If you divide both sides of an equation by the same nonzero number, the equation remains true.

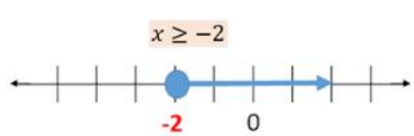
Functions and Inequalities

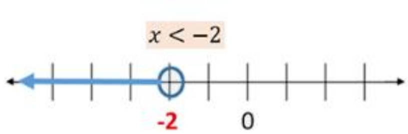


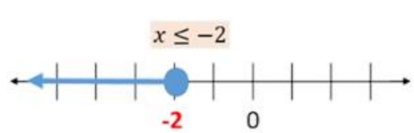


Inequalities			
<	>	≤	≥
• is less than • is fewer than	• is greater than • is more than	• is less than or equal to • is at most	• is greater than or equal to • is at least



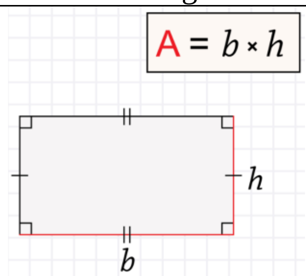
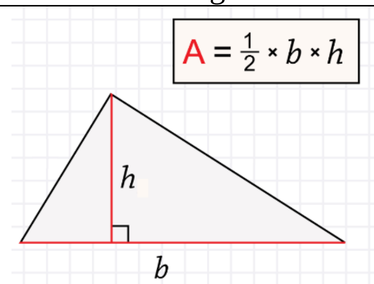
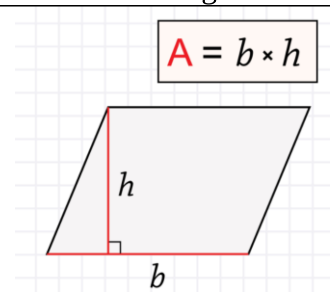


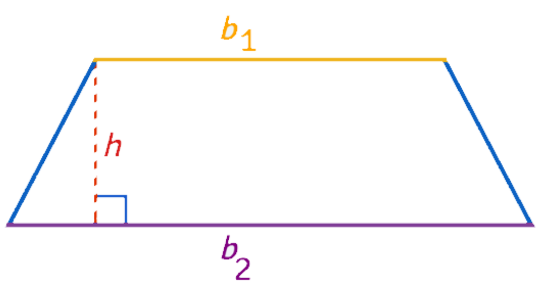


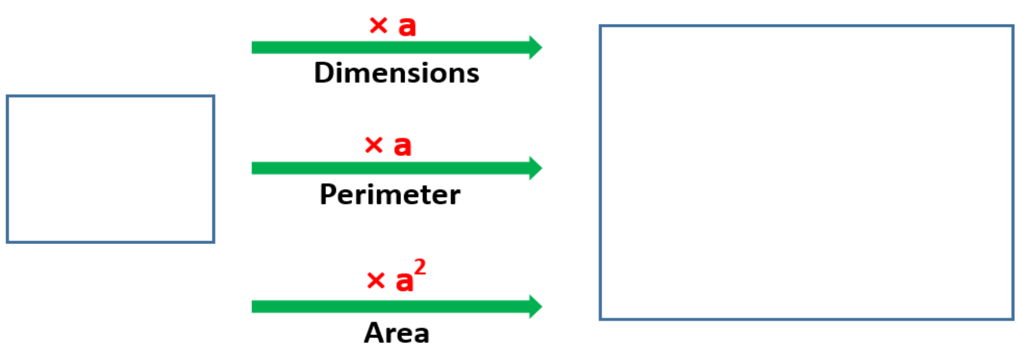


Addition Property of Inequality	Subtraction Property of Inequality
If you add the same number to each side of an inequality, the inequality remains true.	If you subtract the same number from each side of an inequality, the inequality remains true.

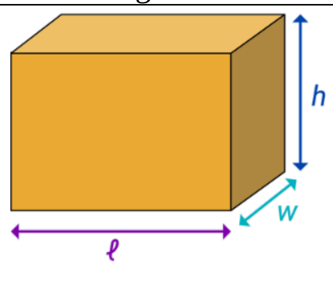
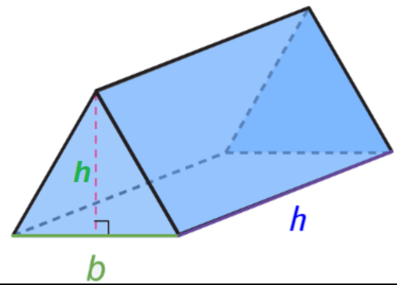
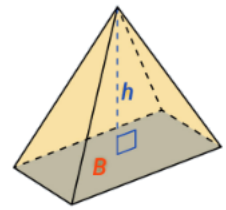
Area

Rectangle	Triangle	Parallelogram
		

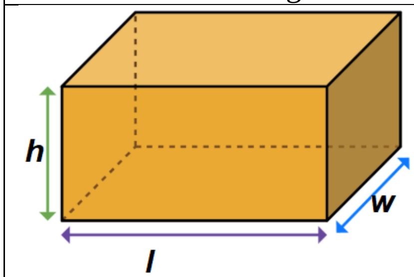
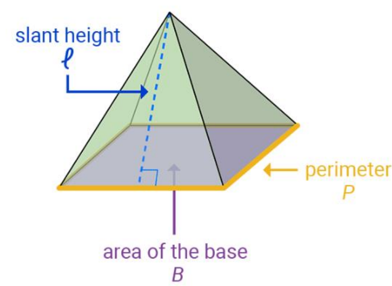
Trapezoid
$A = \frac{1}{2}h\,(b_1 + b_2)$ 

Changes in Dimensions


Volume

Rectangular Prism	Triangular Prism	Pyramid
 $V = \ell w h$	$V = Bh$ or $V = (\frac{1}{2}bh)h$ 	 $V = \frac{1}{3}Bh$ $V = \frac{Bh}{3}$

Surface Area

Rectangular Prism	Pyramid
 $S.A. = 2lh + 2lw + 2hw$	 $S.A. = \frac{1}{2}P\ell + B$

Mean, Median, and Mode

Mean	Median	Mode
$Mean = \frac{\text{sum of the data}}{\text{number of data values}}$	The value in the middle of an ordered data set.	Mode is the number or numbers that occur most often.
The mean is most useful when the data has no outliers. The median is most useful when the data have one or more outliers but no big gaps in the middle of the data. The mode is most useful when the data have many identical numbers.		

Measures of Variation

Range	Interquartile Range (IQR)	Outlier
$Range = Greatest\ value - least\ value$	$IQR = Q_3 - Q_1$	An outlier is a data value that is either much greater or much less than the median. Outliers are more than 1.5 times the value of the interquartile range beyond the quartiles.

Mean Absolute deviation

1. Find the mean
2. Find the absolute value of the differences between each value in the data set and the mean.
3. Find the average of the absolute values of the differences between each value in the data set and the mean.

Shape of Data Distributions

Symmetric: The left side of the distribution looks like the right side.
Cluster: Data grouped closely together.
Gap: A number that does not have a data value.
Peak: The most frequently occurring value, or mode.

- Symmetric
  - Center: Mean
  - Spread: Mean absolute deviation
- Not Symmetric
  - Center: Median
  - Spread: Interquartile Range

Select an Appropriate Display

Type	Criteria
Box Plot	Very large sets of data. Doesn't show individual data
Histogram	Data is divided into equal intervals
Line Graph	Shows the change over time
Line Plot	Shows the frequency of individual data values
Bar Graph	Categorical data

PART B. Recall and Practice

Integers and the Coordinate Plane

Recall

$\lvert 8\rvert + \lvert -6\rvert = 8 + \lvert -6\rvert$	The absolute value of 8 is 8.
$= 8 + 6$	The absolute value of –6 is 6.

Write $-\frac{4}{9}$ as a decimal.

$$\begin{array}{r} 0.444... \\ 6\overline{)4.000} \\ -\underline{36} \\ 40 \\ -\underline{36} \\ 40 \\ -\underline{36} \\ 4 \end{array}$$

Notice that the remainder will never be zero.

You can use bar notation in $-0.\overline{4}$ to indicate that 4 repeats forever.
So, $-\frac{4}{9} = -0.\overline{4}$. $-\frac{4}{9}$ is a repeating decimal.

Compare –0.91 and $-\frac{7}{8}$.

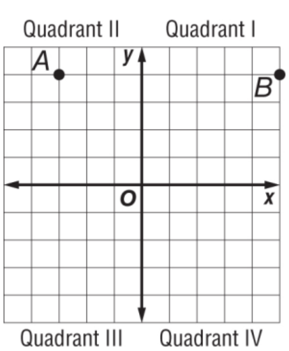
Rename $-\frac{7}{8}$ as a decimal.

$-\frac{7}{8} = -0.875$

$-0.91 < -0.875$

So, $-0.91 < -\frac{7}{8}$.

Identify the ordered pair that names Point *A*.



Step 1 the Start at the origin. Move left on the *x*–axis to find

x–coordinate of point *A*, which is –3.

Step 2 which is Move up the *y*–axis to find the *y*–coordinate,

4. Point *A* is named by (–3, 4).

Practice

Write an integer for each situation.

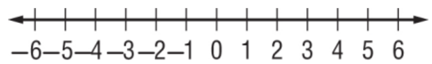
1. a drop of 200 meters

2. an expansion of 6 cubic millimeters

3. Ahmed made a profit of AED 730 on Sunday. Write an integer to represent this profit.

Graph the set of integers on a number line.

4. {–5, –2, 1, 4}



5. Find the opposite of each integer.

a. 10

b. -25

c. 82

d. -135

6. Find the opposite of the opposite of each integer.

a. -4

b. 15

Evaluate each expression.

7. $|-23| + |-5|$

8. $|32 - 22|$

9. $|30| + |-6|$

10. $|-18| - |-2|$

Compare. Use < or >.

11. 12 ____ –23

12. –9 ____ –1

13. –8 _____ 0

Order each set of numbers from least to greatest.

14. {1.5, –2, 0. 5, –3, 7.5}

15. {23, –30, –36, –20, 15, –12}

Order each set of integers from greatest to least.

16. {100, –189, 124, –619, –99}

17. {–6, 1.7, –20, 1.5, –1.8, 2.1}

Write each fraction as a decimal. Use bar notation if the decimal is a repeating decimal.

18. $\frac{3}{8}$

19. $\frac{2}{9}$

20. $-\frac{6}{7}$

Write each decimal as a fraction or mixed number in simplest form.

21. -1.75

22. -3.24

23. -0.12

24. Salem won 7 of the 15 games he played. Write Salem's fraction of wins as a decimal.

Compare. Use <, >, or =.

25. $-3\frac{4}{25}$ -3.16

26. $7\frac{3}{10}$ -8.3

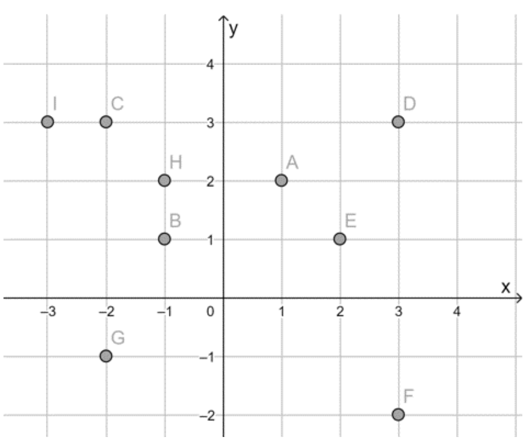
27. $-\frac{8}{11}$ $-\frac{1}{9}$

Order the following sets of numbers from least to greatest.

28. $\left\{40.12, -40\frac{1}{4}, -40.3, 40\frac{2}{5}\right\}$

29. A diver's depth levels are recorded in the table at the right. Order the numbers from least to greatest.

Depth (m)
-7.3
-3.5
$-7\frac{4}{5}$
$-3\frac{1}{8}$



Use the coordinate plane at the left. Identify the point for each ordered pair.

30. (–2, 3)

31. (3, –2)

Write the ordered pair that names each point. Then identify the quadrant where each point is located.

32. *E*

33. *H*

Graph and label each point on the coordinate plane.

34. $A(-3, 0)$ **35.** $B(3, 1)$

36. $C(-4, -1)$ **37.** $D(0, -1)$

Expressions

Recall

Write 3 × 3 × 3 × 3 using an exponent. $\mathbf{3 \times 3 \times 3 \times 3} = 3^4$ 3 is used as a factor four times.
Write 2^4 as a product of the same factor. Then find the value. The base is 2. The exponent is 4. So, 2 is used as a factor four times. $2^4 = 2 \times 2 \times 2 \times 2$. $= 16$
Evaluate $y + x$ if $x = 20$ and $y = 31$. $y + x = 31 + 20$ $= 51$
Simplify the expression $2x + (5y + 3x)$. $2x + (5y + 3x) = 2x + (3x + 5y)$ Commutative Property $= (2x + 3x) + 5y$ Associative Property $= 5x + 5y$ Combine like terms.

Practice

Write each product using an exponent.

1. $5 \times 5 \times 5$ **2.** $0.7 \times 0.7 \times 0.7 \times 0.7$

Write each power as a product of the same factor. Then find the value.

3. 2.1^4 **4.** 6^3

Find the value of each expression.

5. $18 + 10 \times 5$ **6.** $12 \times (12 \div 3) - 16$ **7.** $3^2 + 3 \times 4$

8. $7 \times (5^2 - 12) - 8$ **9.** $9 + (2^3 \div 2) \times 3 - 11$

10. A store sells cups for AED 20 each and plates for AED 15 each. Write an expression for the total cost of 5 cups and 2 plates.

Evaluate each expression if *a* = 5, *b* = 6, and *c* = $\frac{1}{6}$

11. $a^2 \div 5$ **12.** $-2b + a^2$ **13.** $b^2 + 6c$

14. $36c \div b$ **15.** $a^2 - (12c)$ **16.** $bc - (2a)$

17. A pizza order costs AED 35 per pizza plus AED 5 delivery fee. The expression AED $(35n + 5)$ represents the cost of *n* ordered pizza. Find the total cost for 4 ordered pizzas.

Define a variable. Then write each phrase as an algebraic expression.

18. nine fewer marks than Hamda

19. one half the area of the room

20. five times the cost of a book

21. Meera paid AED 38 for a movie ticket and then bought 3 movie tickets. Write an expression to represent the total amount she spent.

Determine whether the two expressions are equivalent. If so, tell what property is applied. If not, explain why.

22. $5 \cdot (8 \cdot x)$ and $(5 \cdot 8) \cdot x$ **23.** $12 + 15$ and $15 + 12$

24. $12 - (6 - 2)$ and $(12 - 6) - 2$

25. $9 \bullet 1$ and 9

26. $a \bullet 0$ and 1

27. $10 \div 2$ and $2 \div 10$

Use one or more properties to rewrite each expression as an expression that does not use parentheses.

28. $(a + 12) + 8$

29. $17 + (3 + x)$

30. $8 \bullet (5 \bullet b)$

31. $8 + (m + 2)$

Find each product mentally. Show the steps you used.

32. 7×31

33. 5×4.8

Use the Distributive Property to rewrite each algebraic expression.

34. $5(n + 4)$

35. $12(2 + r)$

Simplify each expression.

36. $(9 + x) + 3x$

37. $4 \bullet (5 \bullet x)$

38. $5a + (2b + 3a)$

39. $(5y + 9x) + 6y$

40. $15 \bullet (x \bullet 2)$

41. $12(5a)$

Translate each verbal expression into an algebraic expression. Then, simplify the expression.

42. The product of eight and a number is multiplied by six.

43. The sum of 5 times a number and twelve is added to nine times the same number.

44. Three times of the sum of a number and five are added to twelve times the same number.

Equations

Recall

Solve	Check
$y + 3 = 7$ $-3 \quad -3$ $y = 4$	$y + 3 = 7$ $4 + 3 \stackrel{?}{=} 7$ $7 \stackrel{?}{=} 7$ ✓
$r - 7 = 12$ $+7 \quad +7$ $r = 19$	$r - 7 = 12$ $19 - 7 \stackrel{?}{=} 12$ $12 \stackrel{?}{=} 12$ ✓
$-9y = 72$ $\frac{\cancel{-9}y}{\cancel{-9}} = \frac{72}{-9}$ $y = -8$	$-9y = 72$ $-9(-8) \stackrel{?}{=} 72$ $72 = 72$ ✓
$\frac{a}{4} = -20$ $\cancel{4} \times \frac{a}{\cancel{4}} = -20 \times 4$ $a = -80$	$\frac{a}{4} = -20$ $\frac{-80}{4} \stackrel{?}{=} -20$ $-20 = -20$ ✓

Practice

Identify the solution of each equation from the list given.

1. $x + 5 = 12$; 6, 7, 8

2. $k - 10 = 13$; 21, 22, 23

3. $6p = 30$; 5, 6, 7

4. $36 \div m = 3$; 10, 11, 12

Solve each equation. Check your solution.

5. $95 + b = 100$

6. $t + 5.2 = 6.4$

7. $\frac{2}{5} = \frac{3}{10} + x$

8. $10 = m - 5$

9. $x - 4.3 = 9.7$

10. $y - \frac{3}{12} = 1$

11. $6a = 54$

12. $0.2m = 2.4$

13. $\frac{5}{9}x = \frac{1}{9}$

14. $7 = \frac{x}{4}$

15. $0.3 = \frac{m}{9}$

16. $0.9 = \frac{y}{0.3}$

17. Afra bought a box of markers. She gave 18 markers to her friend. Afra now has 42 markers. Write and solve an equation to find how many markers were in the box she bought.

18. Afra had 18 markers, then she bought a box of markers. Afra now has 42 markers. Write and solve an equation to find how many markers were in the box she bought.

19. Afra bought a box of markers. She gave one third of the markers in the box to her friend. If Afra gave her friend 12 markers. Write and solve an equation to find how many markers were in the box she bought.

20. Afra bought 12 identical boxes of markers. The boxes contained 144 markers in total. Write and solve an equation to find how many markers were in each box she bought.

Functions and Inequalities

Recall

Write an equation to represent the function.

Input, x	Output, y
1	6
2	12
3	18
4	24
5	30

Input, x	Output, y	
1	6	+6
2	12	+6
3	18	+6
4	24	+6
5	30	

→ So,

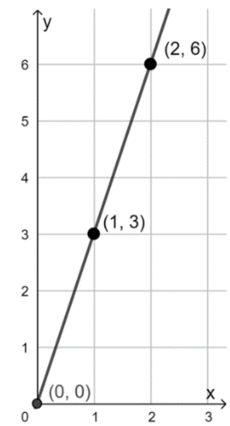
Input, x	Multiply by 6	Output, y	
1	1 x 6	6	+6
2	2 x 6	12	+6
3	3 x 6	18	+6
4	4 x 6	24	+6
5	5 x 6	30	

The value of y is 6 times the value of x. *So,* $y = 6x$

Graph the equation $y = 3x$.

Select any three values for the input x, for example, 0, 1, and 2. Substitute these values for x to find the output y.

x	$3x$	y	(x, y)
0	3(0)	0	(0, 0)
1	3(1)	3	(1, 3)
2	3(2)	6	(2, 6)



The ordered pairs (0, 0), (1, 3), and (2, 6) represent the function. They are solutions of the equation.

Multiple Representations of Functions

Words

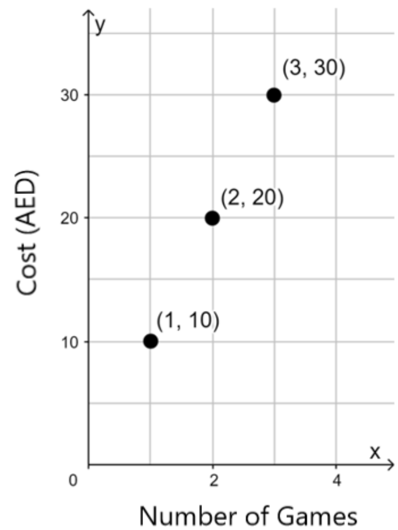
The total cost of games is equal to AED 10 times the number of games.

Table

Number of games, x	Cost (AED), y
1	10
2	20
3	30

Equation

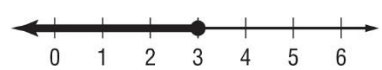
$y = 10x$



Solve $x + 5 \leq 8$. Graph the solution on a number line.

$$\begin{array}{r} x + 5 \leq 8 \\ \underline{-5 \quad -5} \\ x \leq 3 \end{array}$$

The solution is $x \leq 3$. To graph it, draw a closed dot at 3 and draw an arrow to the left on the number line.



Practice

Complete each function table.

1.

Input (x)	$2x$	Output (y)
0		
3		
6		

2.

Input (x)	$5 + x$	Output (y)
1		
2		
3		

Find the input for each function table.

3.

Input (x)	$x - 2$	Output (y)
	$10 - 2$	8
	$12 - 2$	10
	$14 - 2$	12

4.

Input (x)	$x \div 2$	Output (y)
	$4 \div 2$	2
	$6 \div 2$	3
	$8 \div 2$	4

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the twentieth term in the sequence.

5.

Position	5	6	7	8	n
Value of Term	15	18	21	24	

Determine how the next term in the sequence can be found. Then find the next two terms in the sequence.

6. 2.1, 2.5, 2.9, 3.3, …

Find the missing number in the sequence.

7. 7, , 22, $29\frac{1}{2}$, …

Write an equation to represent each function.

8.

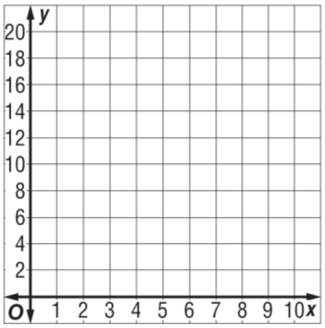
Input, x	1	2	3	4	5
Output, y	6	12	18	24	30

9.

Input, x	10	20	30	40	50
Output, y	5	10	15	20	25

Graph the equation.

10. $y = 2x + 1$



11. Fatema pays AED 0.4 per minute on phone calls.

a. Write an equation to represent the situation.
b. Make a function table.
c. Graph this equation.
d. Analyze the graph to find how much will Fatema pay for 15 minutes.

12. Determine which number is a solution of the inequality.

a. $14 + a < 24$; 8, 9, 10

b. $12 - x \leq 6$; 5, 6, 7

c. $8.6 + r \geq 16.6$; 7, 8, 9

d. $48 - t > 8$; 39, 40, 41

13. Write an inequality for each sentence.

a. The maximum weight *w* is 45 kilograms.

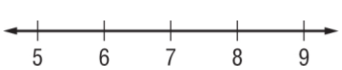
b. The cost of the book *c* is over AED 120.

c. The maximum height *h* for any student is 150 cm.

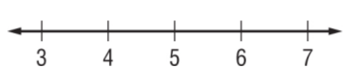
d. You must be at least 18 years old to drive.

14. Graph each inequality on the number line.

a. $x > 6$



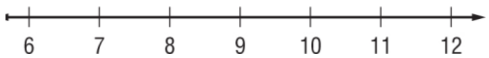
b. $x \geq 4$



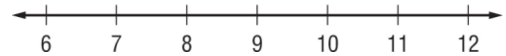
c. $y < 3$

15. Solve each inequality. Then graph the solution on a number line.

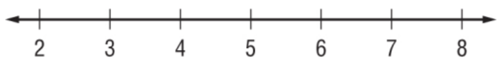
a. $7x > 63$



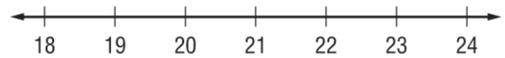
b. $x - 4 \leq 5$



c. $y + 6 \geq 10$



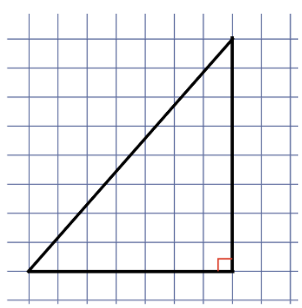
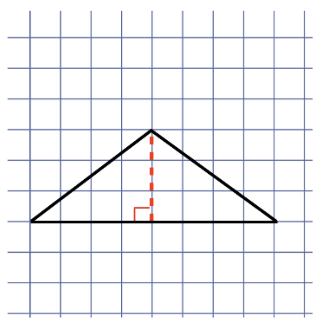
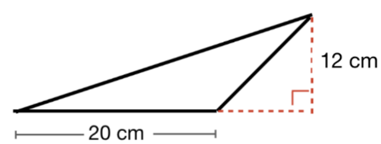
d. $\frac{y}{7} < 3$



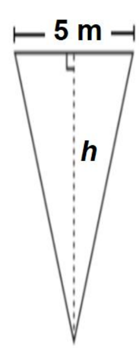
Area of Triangles

Recall

A. Find the area of each triangle.

 h = 7 units b = 8 units Area $= \frac{1}{2}bh$ $= \frac{1}{2}(8)(7)$ $= \frac{1}{2}(56)$ = 28 square units.	 h = 3 units b = 8 units Area $= \frac{1}{2}bh$ $= \frac{1}{2}(8)(3)$ $= \frac{1}{2}(24)$ = 12 square units.	 h = 12 cm b = 20 cm Area $= \frac{1}{2}bh$ $= \frac{1}{2}(20)(12)$ $= \frac{1}{2}(240)$ $= 120\ cm^2$.

B. Find the height of the given triangle if its area is 30 m^2.



b = 5 m.

$Area = \frac{1}{2}bh$

$30 = \frac{1}{2}(5)h$ Multiply both sides by 2.

$60 = 5h$ Divide both sides by 5.

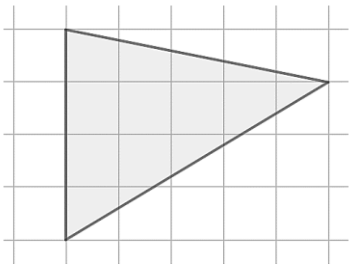
$12 = h$

The height of the triangle is 12 meters.

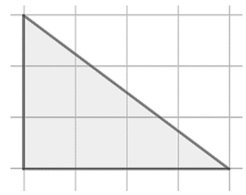
Practice

Find the area of each triangle.

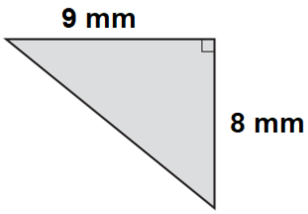
1.



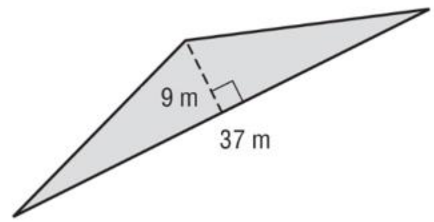
2.



3.



4.



Find the missing dimension.

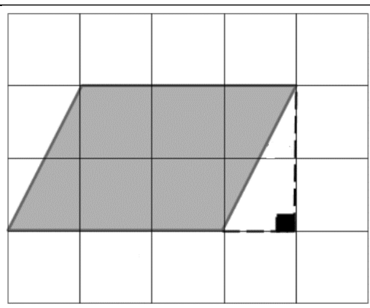
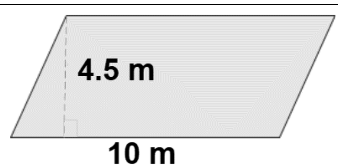
5. height: 12 m
area: 156 m^2

6. base: 15 cm
area: 32 cm^2

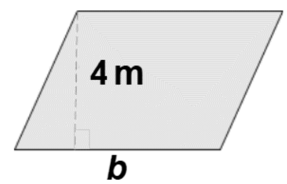
Area of Parallelograms

Recall

A. Find the area of each parallelogram.

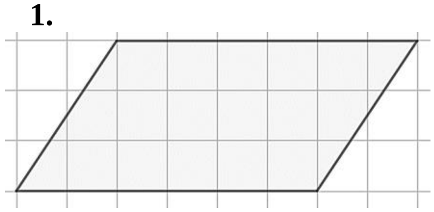
 h = 2 units b = 3 units $Area = bh$ = 3(2) = 6 square units.	 h = 4.5 m b = 10 m $Area = bh$ = 10(4.5) = 45 m^2.

B. Find the base of the given parallelogram if its area is 25 m^2.

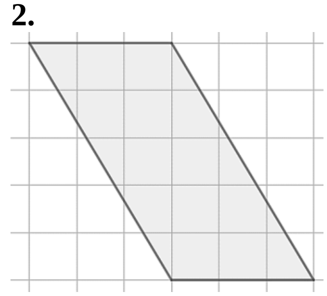
h = 4 m. $Area = bh$ $25 = b(4)$ Divide both sides by 4. $6.25 = b$ The base of the parallelogram is 6.25 meters.	

Practice

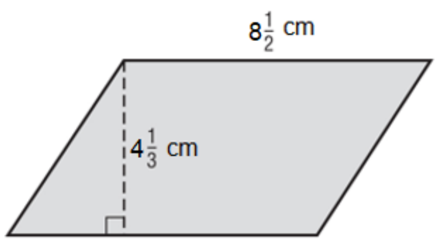
1.



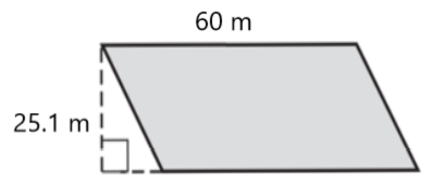
2.



3.



4.



5. Find the base of a parallelogram with height $7\frac{1}{2}$ cm and area $12\frac{3}{4}$ square centimeters.

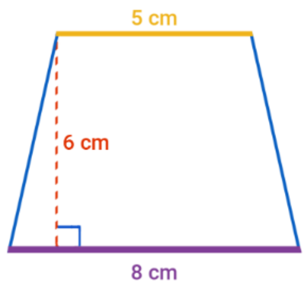
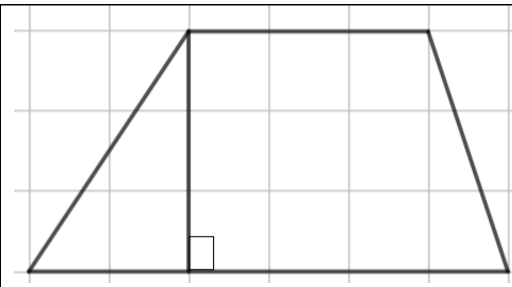
6. Find the height of a parallelogram with base 2.5 meters and area 60 square meters.

7. Hamad is preparing a 78 square meters plot for a garden. The plot will be in the shape of a parallelogram that has a height of 6 meters. What will be the length of the base of the parallelogram? Explain your reasoning.

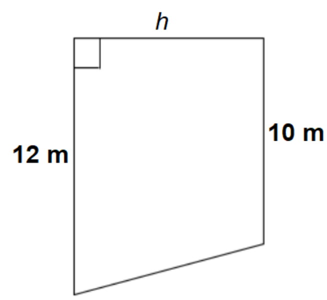
Area of Trapezoids

Recall

A. Find the area of each trapezoid.

 $b_1 = 5\ cm$ $b_2 = 8\ cm$ $h = 6\ cm$ $Area = \frac{1}{2}h(b_1 + b_2)$ $= \frac{1}{2}6(5+8)$ $= \frac{1}{2}6(13)$ $= \frac{1}{2}(78)$ $= 39\ \text{cm}^2$	 $b_1 = 3\ units$ $b_2 = 6\ units$ $h = 3\ units$ $Area = \frac{1}{2}h(b_1 + b_2)$ $= \frac{1}{2}3(3+6)$ $= \frac{1}{2}3(9)$ $= \frac{1}{2}(27)$ $= 13.5$ square units.

B. Find the height of the given trapezoid if its area is 88 m^2.



$b_1 = 10\ m$

$b_2 = 12\ m$

$Area = \frac{1}{2}h(b_1 + b_2)$

$88 = \frac{1}{2}h(10 + 12)$

$88 = \frac{1}{2}h(22)$

$88 = 11h$ Divide both sides by 11.

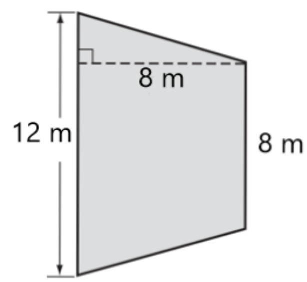
$8 = \text{h}$

The height of the trapezoid is 8 meters.

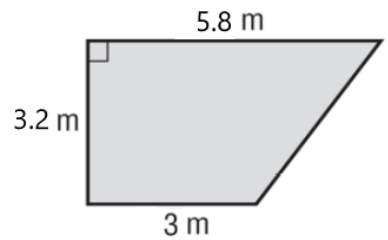
Practice

Find the area of each figure. Round to the nearest tenth if needed.

1.

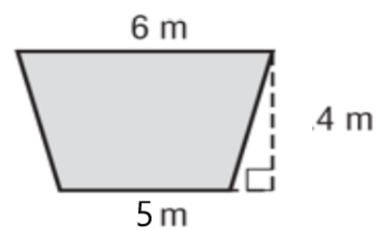


2.



3. A trapezoid has an area of 18 square millimeters. If the bases are 3 mm and 6 mm, what is the height of the trapezoid? **3 in.**

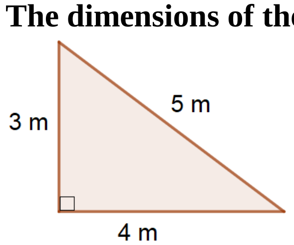
4. A garden has the dimensions shown. Find the area of the garden.



Changes in Dimensions

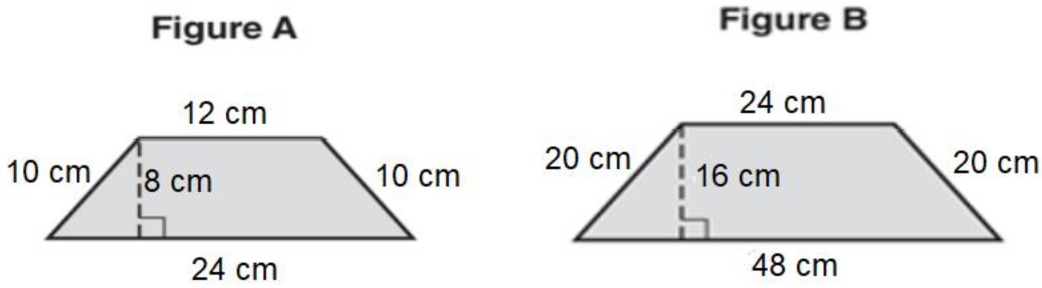
Recall

The dimensions of the given triangle are multiplied by 3. Find its new perimeter and area



Perimeter of the triangle $P = 3 + 4 + 5 = 12$ m	New perimeter $P = 12(3) = 36$ m
Area of the triangle $A = \frac{1}{2}(3)(4)$ $= \frac{1}{2}(12)$ $= 6\ m^2$	New area $A = 6(3)^2$ $= 6(9)$ $= 54\ m^2$

Practice



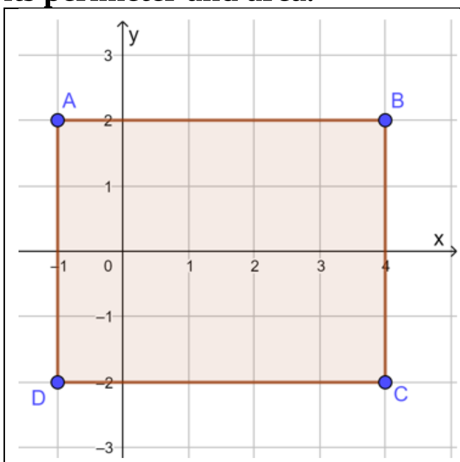
1. Describe the change in the perimeter from Figure A to Figure B.

2. Describe the change in the area from Figure A to Figure B.

Polygons in the Coordinate Plane

Recall

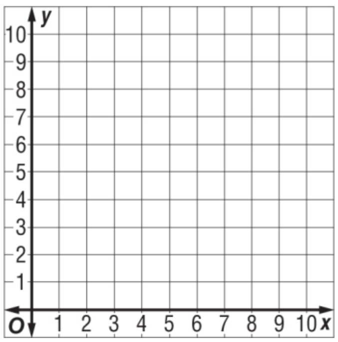
Graph the figure with vertices *A*(–1, 2), B(4, 2), *C*(4, –2), *D*(–1, –2) and classify it. Then find its perimeter and area.

 The figure is a rectangle.	Perimeter = 2(4) + 2(5) = 8 + 10 = 18 units. Area = 4(5) = 20 square units.

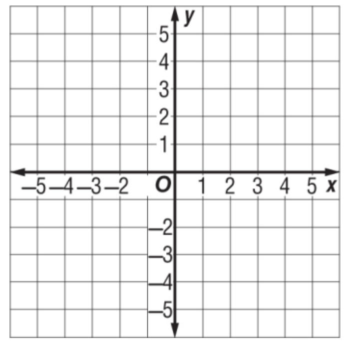
Practice

Graph each figure and classify it. Then find the area.

1. *A*(1, 2), *B*(4, 5), C(5, 2)

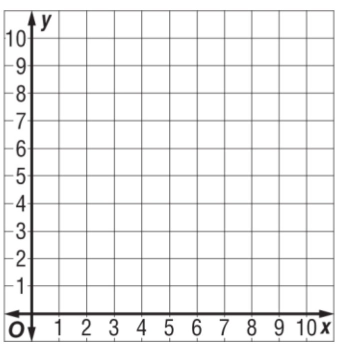


2. *A*(–2, 1), B(3, 1), *C*(1, –2), *D*(–1, –2)



Graph the rectangle with the given vertices, then find its perimeter.

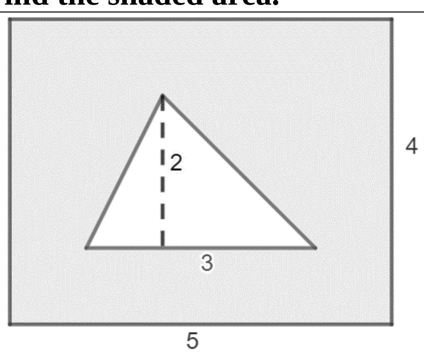
3. *A*(2, 0), *B*(2, 4), *C*(5, 4), *D*(5, 0)



Area of Composite Figures

Recall

Find the shaded area.



Area of rectangle = 5(4) = 20 square units.

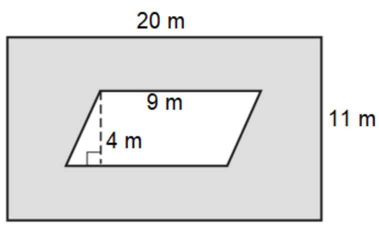
Area of triangle = $\frac{1}{2}(2)(3) = 3$ square units.

Shaded area = Area of rectangle – Area of triangle
= 20 – 3 = 17 square units.

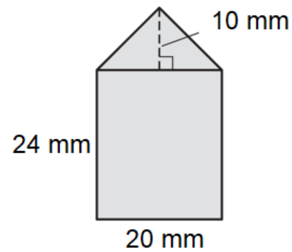
Practice

Find the area of the shaded region in each figure.

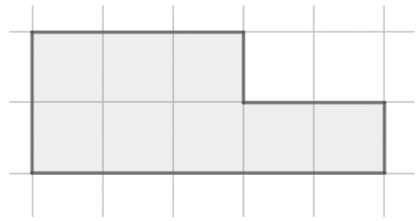
1.



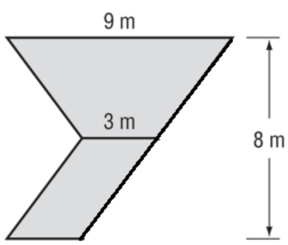
2.



3.

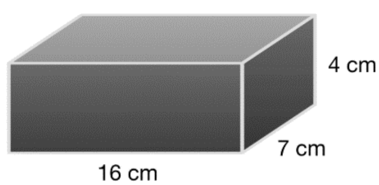
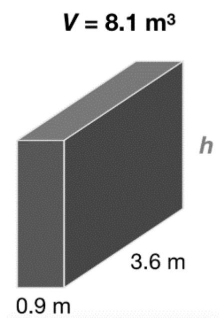


4. The trapezoid and the parallelogram have the same height. Find the shaded area.



Volume of Rectangular Prisms

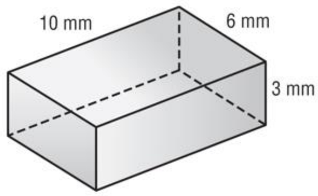
Recall

Find the volume of the rectangular prism.	Find the height of the rectangular prism.
 $V = lwh$ $V = 16(7)(4) = 448\text{ cm}^3$	 $V = lwh$ $8.1 = 0.9(3.6)h$ $8.1 = 3.24h$ $\frac{8.1}{3.24} = \frac{3.24h}{3.24}$ $2.5 = h$ The height of the prism is 2.5 m

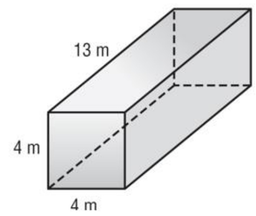
Practice

Find the volume of each rectangular prism.

1.

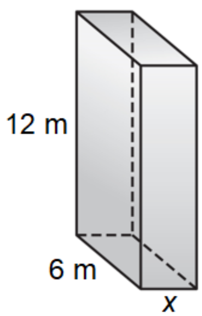


2.



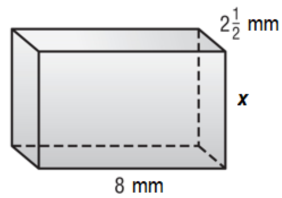
Find the missing dimension of each rectangular prism.

3.



$V = 216\, m^3$

4.



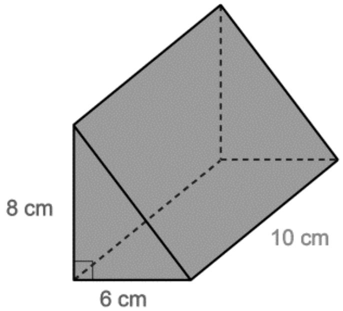
$V = 100\, mm^3$

5. Salem has a box that is 3 meters high, 4 meters long and $2\frac{1}{3}$ meters wide. Find the volume of the box, if its shape is a rectangular prism.

Volume of Triangular Prisms

Recall

Find the volume of the given triangular prism.

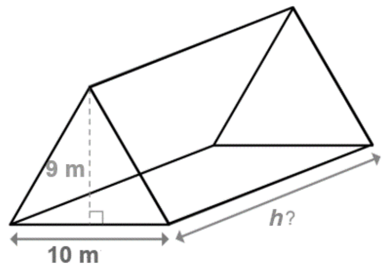


Base area = B = $\frac{1}{2}(8)(6) = 24\ cm^2$

$V = Bh$

$= 24(10) = 240\ cm^3$

Find the height of the given triangular prism with a $Volume = 810\ m^3$.



Base area = B = $\frac{1}{2}(10)(9) = 45\ m^2$

$V = Bh$

$810 = 45h$

$\frac{810}{45} = \frac{45h}{45}$

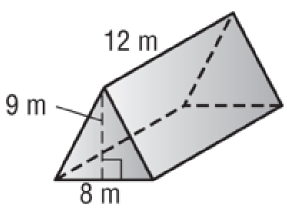
$18 = h$

The height of the prism is 18 meters.

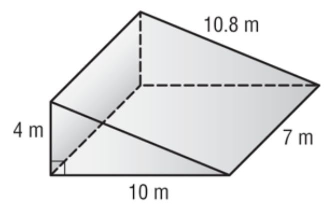
Practice

Find the volume of each triangular prism.

1.

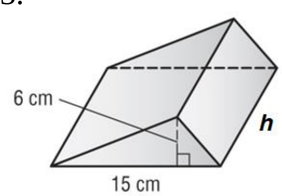


2.



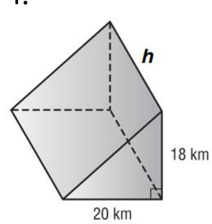
Find the height of each triangular prism.

3.



$V = 450\ cm^3$

4.

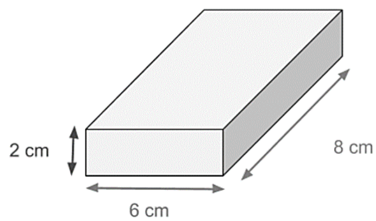


$V = 3{,}780\ km^3$

Surface Area of Rectangular Prisms

Recall

Find the surface area of the rectangular prism.

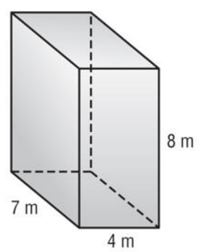


$S.A. = 2lh + 2lw + 2hw$
$S.A. = 2(6)(2) + 2(6)(8) + 2(2)(8)$
$S.A. = 24 + 96 + 32$
$S.A. = 152\text{ cm}^2$

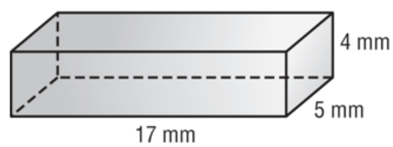
Practice

Find the surface area of each rectangular prism.

1.



2.

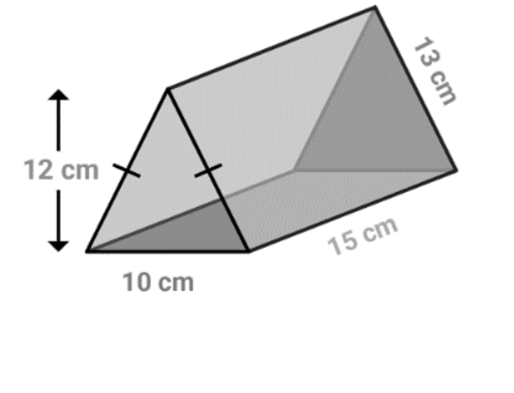


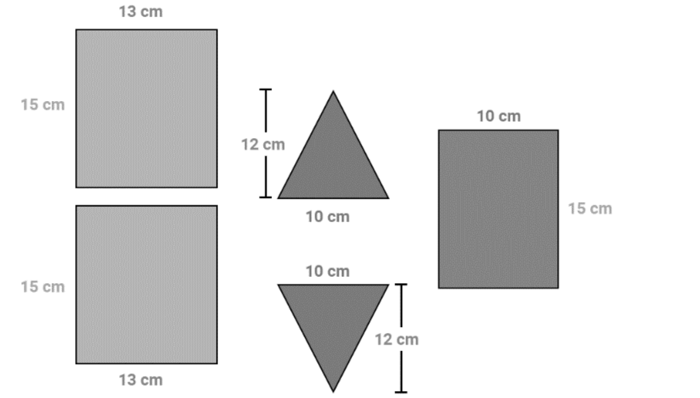
3. Shamma is covering a shoe box with paper. The shoe box is 18 centimeters long, 10 centimeters wide, and 10 centimeters high. What is the total minimum area of the papers that will cover the box?

Surface Area of Triangular Prisms

Recall

Find the surface area of the triangular prism.





Area of each triangular base: $\frac{1}{2}(10)(12) = 60\ cm^2$

Area of the rectangular faces: $(15)(13) = 195\ cm^2$

$(15)(13) = 195\ cm^2$

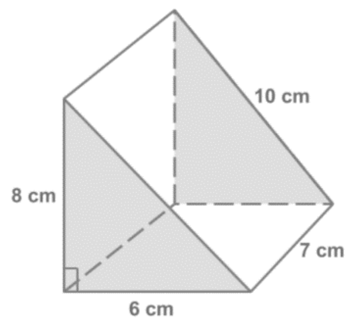
$(15)(10) = 150\ cm^2$

$S.A. = 60 + 60 + 195 + 195 + 150 = 660\ cm^2$

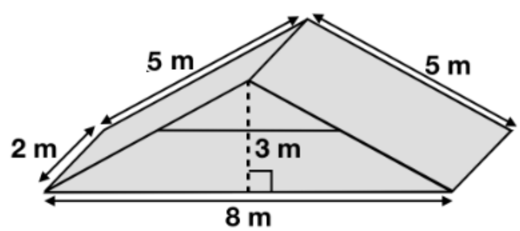
Practice

Find the surface area of each triangular prism.

1.



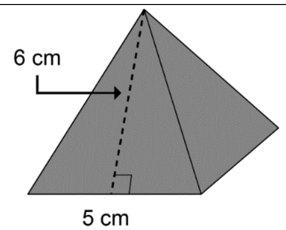
2.



Surface Area of Pyramids

Recall

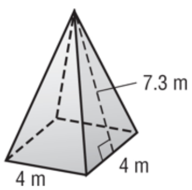
Find the surface area of the square pyramid.

	$S.A. = B + \frac{1}{2}P\ell$ $B = 5(5) = 25\ cm^2$ $P = 5(4) = 20\ cm^2$ $S.A. = 25 + \frac{1}{2}(20)(6)$ $= 25 + 60 = 85\ cm^2$

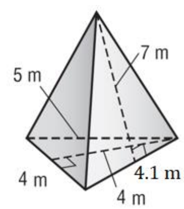
Practice

Find the surface area of each pyramid.

1.

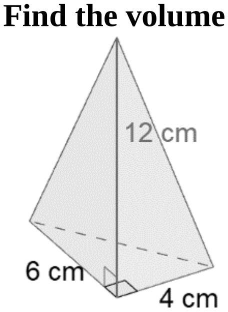
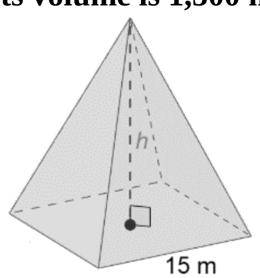


2.



Volume of Pyramids

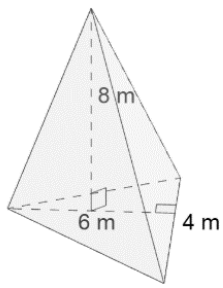
Recall

Find the volume of the triangular pyramid.  $B = \frac{1}{2}(6)(4) = 12\ cm^2$ $V = \frac{1}{3}(12)(12) = 48\ cm^3$	**Find the height of the square pyramid, if its volume is 1,500 m³.**  $1{,}500 = \frac{1}{3}(15)(15)(h)$ $1{,}500 = 75h$ $\frac{1{,}500}{75} = \frac{75h}{75}$ $20 = h$ The height is 20 meters.

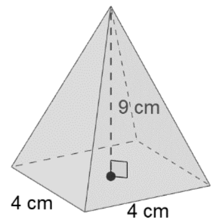
Practice

Find the volume of each pyramid.

1.

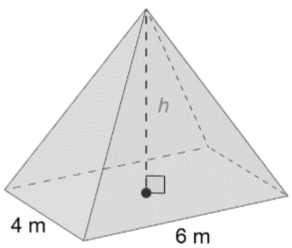


2.

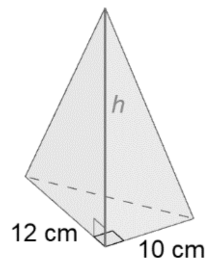


Find the height of each pyramid.

3. Rectangular pyramid with a volume of 240 m^3.

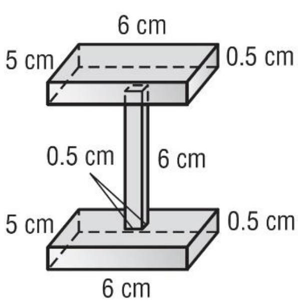


4. Triangular pyramid with a volume of 210 cm^3.

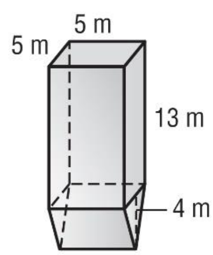


Find the volume of each composite figure.

5.



6.



Mean, Median, and Mode

Recall

Find the mean, median, and mode for the given data. Which measure of center best represents the data. Justify.
2, 5, 31, 3, 2, 3, 5, 5

Order the data.

2, 2, 3, 3, 5, 5, 5, 31

$$Mean = \frac{\text{sum of the data}}{\text{number of data values}} = \frac{2+2+3+3+5+5+5+31}{8} = \frac{56}{8} = 7$$

Median: Middle number in the ordered data set. 3 and 5 are in the middle.

$$Median = \frac{3+5}{2} = 4$$

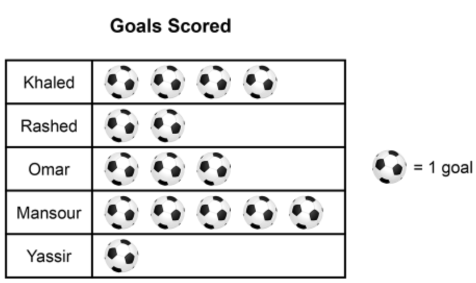
Mode is the most repeated value. Mode = 5

Since the data has an outlier (31). The median best represents the data.

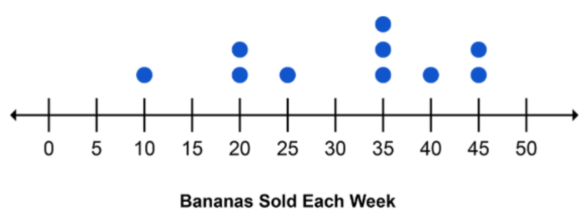
Practice

Find the mean, median, and mode for each set of data. Which measure of center best represents the data. Justify.

1.



2.

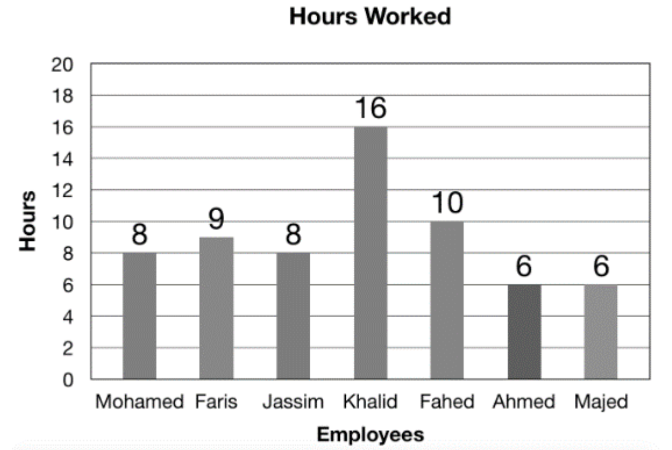


3.

Stem	Leaf
11	4 7
12	0 3 4 8
13	
14	2
15	1 9
16	0

Key: 1|2 = 12

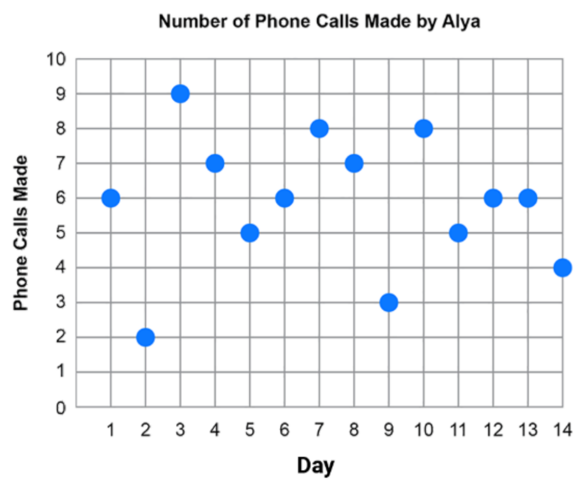
4.



5.

AED 40 AED 37 AED 35 AED 42 AED 40 AED 43 AED 38 AED 37 AED 41

6.



7.

Day	Number of Math Problems
1	12
2	23
3	15
4	15
5	10
6	16
7	17

8.

Score Number	Scores
1	65
2	78
3	66
4	65
5	80
6	65

Measures of Variation

Recall

Find the measures of variation for the number of votes received for students' council president:
13, 20, 18, 12, 21, 2, 18, 17, 15, 10, and 14.

The greatest number in the data set is 21. The least number is 2.
Range = 21 – 2 = 19 votes.

To find the quartiles, arrange the numbers in order from least to greatest.

Q1 median Q3

2 10 12 13 14 15 17 18 18 20 21

IQR = 18 – 12 = 6.

Multiply the IQR by 1.5. $6 \times 1.5 = 9$

Subtract 9 from the first quartile. $12 - 9 = 3$
Add 9 to the third quartile. $18 + 9 = 27$

The limits of the outliers are 3 and 27. The only number of votes beyond the limits is 2.
Outlier: 2.

Practice

1. Use the data in the table.

Weights (kg)									
27	44	27	33	13	59	23	25	18	19

a. Find the range of the data.

b. Find the median and the first and third quartiles.

c. Find the interquartile range.

d. Name any outliers in the data.

2. Use the data in the table.

Monthly Temperature

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
°C	19	24	30	31	33	35	36	38	34	30	28	24

a. Find the range of the data.

b. Find the median and the first and third quartiles.

c. Find the interquartile range.

d. Find any outliers in the data and name them.

Mean Absolute deviation

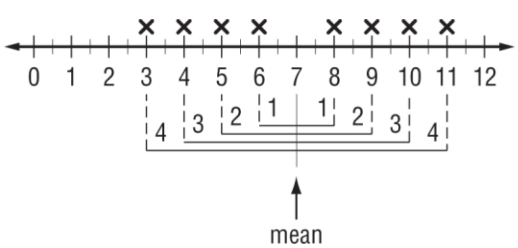
Recall

The table shows the number of hours each member of the study group spent working on the class project. Find the mean absolute deviation of the set of data. Describe what the mean absolute deviation represents.

Project Work Hours			
3	8	11	5
9	6	10	4

Step 1 Find the mean. $\frac{3+8+11+5+9+6+10+4}{8} = 7$

Step 2 Find the absolute value of the differences between each value in the data set and the mean.



$\lvert 7 - 3 \rvert = 4$
$\lvert 7 - 8 \rvert = 1$
$\lvert 7 - 11 \rvert = 4$
$\lvert 7 - 5 \rvert = 2$
$\lvert 7 - 9 \rvert = 2$
$\lvert 7 - 6 \rvert = 1$
$\lvert 7 - 10 \rvert = 3$
$\lvert 7 - 4 \rvert = 3$

Step 3 Find the average of the absolute values of the differences between each value in the data set and the mean.

$$\frac{4+3+2+1+1+2+3+4}{8} = 2.5$$

The mean absolute deviation is 2.5. This means that the data values are an average distance of 2.5 hours from the mean.

Practice

1.

Math Scores		
64	94	88
88	91	100

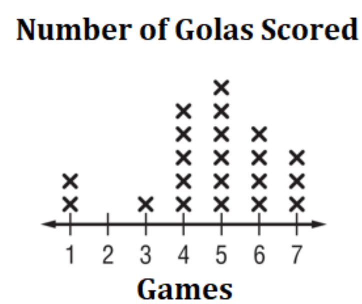
2.

Games Sold						
9	16	33	24	12	19	27

Statistical Displays

Line Plots

The line plot below represents the total number of goals in each game by Saleh's football team this year. Use the information on the line plot to answer the questions.



1. How many times did the team score 6 goals?

2. What is the median number of goals scored?

3. What is the mode of the data?

4. Find the range and any outliers of the data.

Histograms

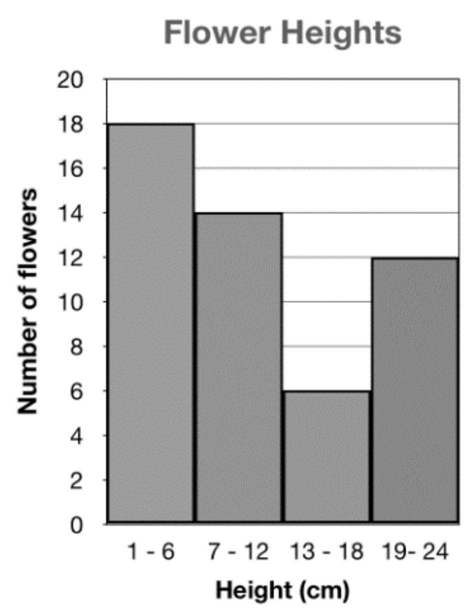
Use the histogram shown at the right.

1. Which interval represents the most number of flowers?

2. Which interval has fourteen flowers?

3. How many flowers are at least 13 cm tall?

4. How many flowers are less than 19 cm tall?



5. Draw a histogram to represent the set of data.

Height of plants		
Height (cm)	**Tally**	**Frequency**
0–4	||||	4
5–9	|||| ||||	10
10–14	|||| |||| ||	12
15–19	|||| |||	8
20–24	||||	5
25–29	|	1

Box Plots

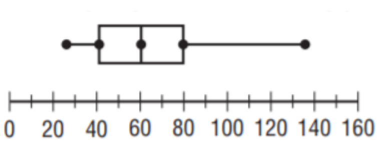
Draw a box plot for each set of data.

1. {3, 7, 4, 3, 11, 6, 6}

2. {12, 9, 16, 11, 5, 12, 18}

3. Find the median and the measures of variability for the box plot shown. Then describe the data.

Price of Shirts

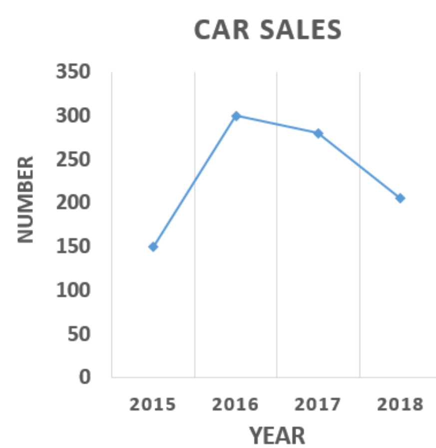


Line Graphs

1. Describe the change in the number of cars sold.

2. Predict the number of cars sold in 2019. Explain your reasoning.

3. Predict the number of cars sold in 2014. How did you reach this conclusion?



The table shows the number of games won by the purple team in the school athletics from 2010 to 2018.

Florida Gators Baseball Statistics									
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Games Won	12	15	18	16	16	13	10	15	20

4. Make a line graph of the data.

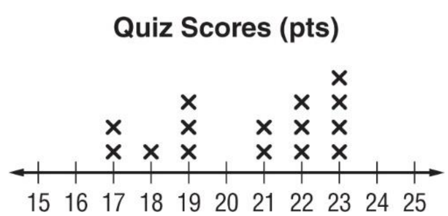
5. In what year did the team have the greatest increase in the number of games won?

Shape of Data Distributions

Recall

The line plot shows the quiz scores in an Arabic class. Describe the shape of the distribution.

The shape of the data is **not symmetric** because the left side of the data does not look like the right side.



There are **clusters** from 17−19 and 21−23.

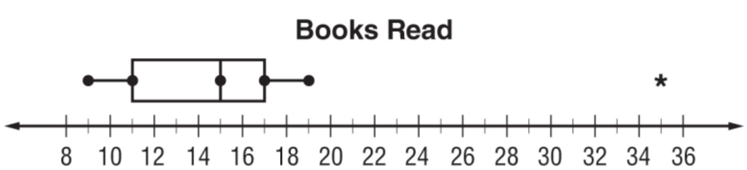
The distribution has a **peak** at 23.

There is a **gap** at 20.

There are no **outliers**.

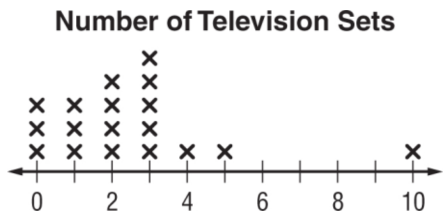
Practice

1. Describe the shape of the distribution.



2. Choose the appropriate measures to describe the center and spread of the distribution. Justify your response based on the shape of the distribution.

3. The line plot shows the number of television sets owned by the families of various sixth grade students.



a. Choose the appropriate measures to describe the center and spread of distribution. Justify your response based on the shape of the distribution.

b. Write a few sentences describing the center and spread of the distribution using the appropriate measures.

Select an Appropriate Display

Select an appropriate type of display for data gathered about each situation.

1. heights of buildings in town
2. Height of 500 students.

3. number of cars a dealer sold each month over the past year

4. number of scores made by each team member in a basketball season

PART C. Mock Exam I

Part I. Choose the correct answer.

1) Evaluate $|-8|$

a) -8 b) 0

c) 8 d) 5

2) Simplify $|-12| + |20|$.

a) 32 b) 8

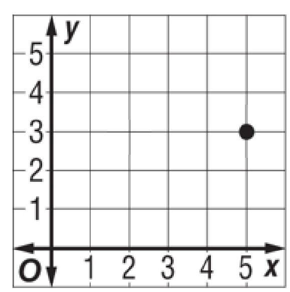
c) -32 d) -8

3) Which set of integers is graphed on the number line?

a) {−3, 7, 1, −2} b) {7, −1, 2, −3}

c) {−3, 1, 2, −7} d) {−2, 3, 1, 7}

4) Which ordered pair represents the point on the coordinate plane?



a) (5, 3) b) (3, 5)

c) (4, 3) d) (5, 5)

5) Which situation does the integer 5 best represent?

a) 5 degrees below zero b) 5 degrees above zero

c) 5 steps down d) losing AED 5

6) The volume of a cube can be found using the expression 5^3. What is 5^3 written as a product of the same factor?

a) $5 \times 5 \times 5$ b) 5×3

c) $3 \times 3 \times 3 \times 3 \times 3$ d) 3×5

7) What is the value of $5^2 + 3$?

a) 13 b) 28

c) 8 d) 25

8) Simplify $16 - 2 \times 4 + 1$.

a) 8 b) 56

c) 57 d) 9

9) What is the value of ab if $a = 6$ and $b = 8$?

a) 14 b) 84

c) 48 d) 42

10) What is the value of $5 + 2m$ if $m = \frac{3}{8}$?

a) $7\frac{1}{4}$ b) $7\,\frac{3}{8}$

c) $5\,\frac{3}{4}$ d) $5\,\frac{3}{8}$

11) Write an algebraic expression for the following verbal expression. 14 more pencils than the first pencil case.

a) $14p$ b) $14 - p$

c) $p + 14$ d) $14 \div p$

12) Which property is illustrated by the statement 2(5) = 5(2)?

a) Associative b) Distributive

c) Commutative d) Identity

13) Which of the following is equivalent to $5 \bullet (8 \bullet 3)$?

a) 43 b) $5 \bullet (5 \bullet 4)$

c) $(5 \bullet 8) \bullet 3$ d) $5 + (8 + 3)$

14) Use the Distributive Property to rewrite $7(x + 4)$.

a) $7x + 21$ b) $28x$

c) $7x + 28$ d) $x + 28$

15) Simplify $6x + 9 + 3x$.

a) $18x + 9$ b) $9x$

c) $9x + 9$ d) $18x$

16) Write an expression equivalent to $4(3x + 2y)$

a) $12x + 8y$ b) $20xy$

c) $20x$ d) $12x + 8$

17) What is the factored form of $14x + 28y$?

a) $7(2x + 3y)$ b) $2x + 4y$

c) $7(2x + 4y)$ d) $7xy(2 + 4)$

18) Solve. $4 + m = 14$.

a) 11 b) 10

c) 26 d) 28

19) Solve. $a - 12 = 3$.

a) 15 b) 14

c) 9 d) 4

20) Solve. $6x = 60$.

a) 30 b) 54

c) 10 d) 66

21) Solve. $\frac{d}{4} = 7$

a) 3 b) 28

c) 11 d) 21

22) What is the rule to find the value of the missing term in the table?

Position	1	2	3	4	*n*
Value of Term	5	10	15	20	■

a) $n + 1$ b) $5n$

c) $n + 4$ d) $4n + 1$

23) Which of the following is a solution of the inequality $5x \geq 15$?

a) 0 b) 1

c) 2 d) 4

24) Solve the inequality $x - 3 \leq 7$.

a) $x \leq 4$ b) $x \geq 10$

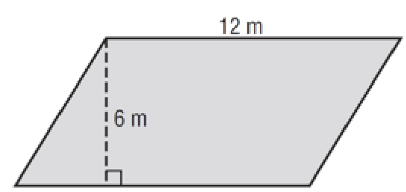
c) $x \geq 4$ d) $x \leq 10$

25) Solve the inequality $5b < 30$

a) $b > 35$ b) $b < 35$

c) $b < 6$ d) $b > 6$

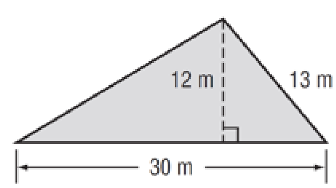
26) Find the area of the parallelogram.



a) 72 m^2 b) 6 m^2

c) 36 m^2 d) 18 m^2

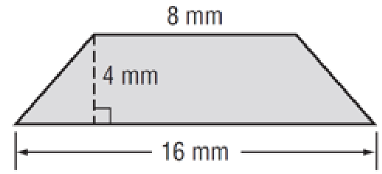
27) What is the area of the triangle?



a) 180 m^2 b) 225 m^2

c) 360 m^2 d) 450 m^2

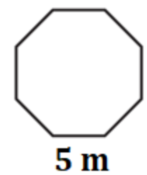
28) What is the area of the given trapezoid?



a) 270 mm^2 b) 48 mm^2

c) 96 mm^2 d) 24 mm^2

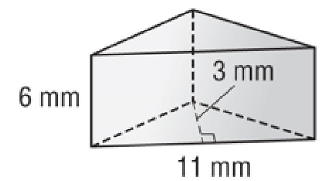
29) The regular octagon shown is enlarged so that its sides are 4 times as large. What effect does this have on the area?



a) The area is 2 times greater. b) The area is 4 times greater.

c) The area is 16 times greater. d) The area stays the same.

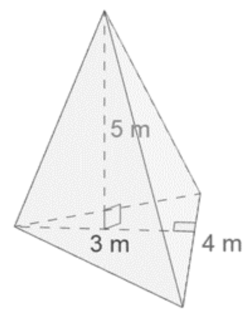
30) Find the volume of the triangular prism.



a) 198 mm^3 b) 99 mm^3

c) 231 mm^3 d) 33 mm^3

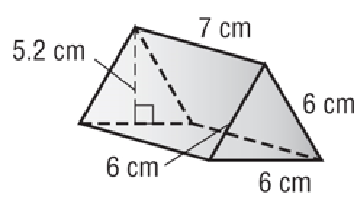
31) Find the volume of the triangular pyramid.



a) 60 m^3 b) 10 m^3

c) 30 m^3 d) 40 m^3

32) Find the surface area of the given prism. Round to the nearest tenth if necessary.



a) 109.2 cm^2 b) 188.4 cm^2

c) 157.2 cm^2 d) 218.4 cm^2

33) What is the mean absolute deviation of the data: 20,5,12,15,16,10?

a) 13 b) 4

c) 10 d) 2.8

34) Which measure of center best represents the set of data: 14, 16, 11, 17, 12, 15, 13, 10, 18, 48

a) mean b) mode

c) median d) range

35) Which of the following is an appropriate display to show the heights of adults arranged by intervals?

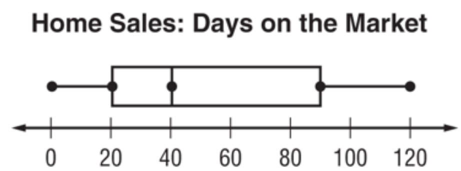
a) bar graph b) line graph

c) circle graph d) histogram

36) The box plot shows the number of days on the market for single family homes in a city. What percent of the homes were on the market less than 90 days?

a) 0% b) 50%

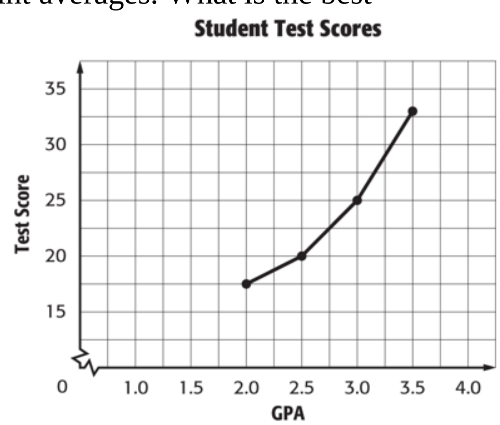
c) 25% d) 75%



37) The graph shows test scores of students with various grade point averages. What is the best prediction of a student with a grade point average of 3.25?

a) 34 b) 29

c) 32 d) 25



Part II. Answer the following questions. Show your work.

38) Order from least to greatest.

a) $-6, 2, 0, -3$.

b) $-4.08, 4\frac{1}{5}, -4\frac{1}{4}, 4.\overline{3}$

39) Admission to the amusement park is AED 50. It costs an additional AED 5 for each ride.

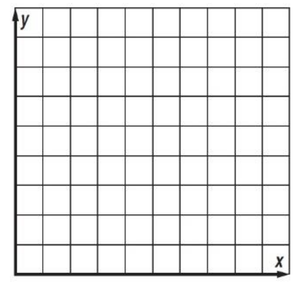
Write and solve an equation to find the number of ride if the total cost is AED 100.

40) Given the equation y = $x + 4$.

a) Complete the function table.

b) Graph the equation.

Input (x)	**$x + 4$**	**Output (y)**
2		
3		
4		



41) Ahmed earns AED 35 for every car he washes.

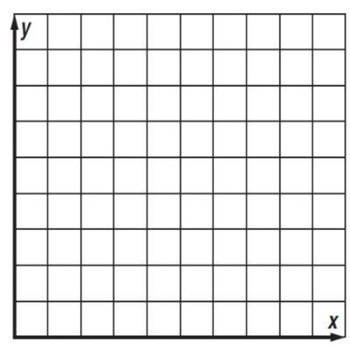
a) Write an equation to find y, the total amount Ahmed will earn after washing x cars.

b) How much will Ahmed earn if he washes 7 cars?

42) A rectangle has vertices $A(2, 3)$, $B(2, 5)$, $C(5, 5)$, and $D(5, 3)$.

a) What is the length of each side of the rectangle?

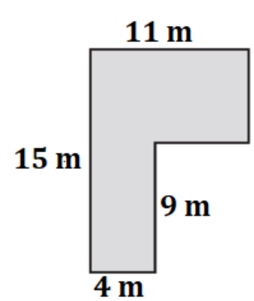
b) What is the perimeter of the rectangle?



43) The figure at the right that shows the dimensions of a basement floor.

a) What is the perimeter of the basement floor?

b) What is the area of the basement floor?



44) A pyramid has all sides that are equilateral triangles. Each triangle has side lengths of 9 centimeters. If the surface area of the pyramid is 140.4 square centimeters, what is the slant height of the pyramid?

45) Use the following set of data: 5, 7, 7, 6, 4, 8, 27, 5, 7, 5, 6, and 5.

a) Find the third and first quartiles of the data.

b) Find the interquartile range of the data.

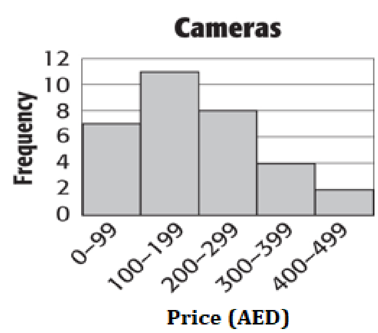
c) Are there any outliers in the data set? Explain.

46) Draw a box plot for the data: 16, 16, 17, 19, 20, 23, 24, 25, 29, 31, 33, 38

47) Refer to the histogram.

a) How many cameras cost less than AED100?

b) Which price range has the least frequency?



PART D. Mock Exam II

Part I. Choose the correct answer.

1) Write $-\frac{4}{5}$ as a decimal.

a) -4.5 b) -0.8

c) 0.8 d) $-4.\overline{5}$

2) Simplify $|12 + 6|$.

a) -18 b) 6

c) 18 d) -6

3) What is the opposite of 15?

a) 15 b) $|15|$

c) -15 d) $\frac{1}{15}$

4) Which quadrant contains the point named by (–2, –3)?

a) Quadrant I b) Quadrant III

c) Quadrant II d) Quadrant IV

5) Which of the following points is located in Quadrant II?

a) (1, 4) b) (−2, −4)

c) (3, −2) d) (−1, 5)

6) Which number is less than –5?

a) 0 b) −10

c) −5 d) 5

7) What is $2 \times 2 \times 2 \times 2$ written using an exponent?

a) 4^2 b) 2^4

c) 16 d) 2×4

8) Simplify $25 + 3^2 – 5$.

a) 26 b) 29

c) 27 d) 23

9) Simplify $4 \times 5 + 7 \times 8$.

a) 168 b) 84

c) 76 d) 59

10) What is the value of $7 + 3x$ if $x = \frac{1}{6}$?

a) $7\frac{1}{6}$ b) $7\frac{1}{2}$

c) $8\frac{1}{2}$ d) $8\frac{1}{6}$

11) What is the value of $19 – p + q$ if $p = 11$, and $q = 10$?

a) 19 b) 24

c) 28 d) 18

12) Write an algebraic expression for the following verbal expression. 8 centimeters shorter than Salma.

a) $s – 8$ b) $8 – s$

c) $8 + s$ d) $s \div 8$

13) Which property is illustrated by the statement $5(1) = 5$?

a) Associative b) Distributive

c) Commutative d) Identity

14) Which of the following is the factored form of the expression $20 + 15$?

a) $5(2 + 3)$ b) $5(4 + 3)$

c) $5(4 + 5)$ d) $(4 + 3)$

15) Use the Distributive Property to rewrite $3(5 + x)$

a) $18x$ b) $15 + x$

c) $15 + 3x$ d) $5 + 3x$

16) Simplify $5x + 2 + 7x$.

a) $12x + 2$ b) $14x + 2$

c) $12x$ d) $14x$

17) Write an expression equivalent to $5(3a + 4b)$

a) $15a + 20b$ b) $35a$

c) $35ab$ d) $15a + 20$

18) What is the factored form of $32x + 40y$?

a) $16(2x + 3y)$ b) $8(4x + 5y)$

c) $8xy(4 + 5)$ d) $(4x + 5y)$

19) Solve. $5d = 35$.

a) 5 b) 30

c) 7 d) 40

20) Solve. $42 = 6 + m$.

a) 7 b) 36

c) 8 d) 48

21) Solve. $9 = x – 7$.

a) 16 b) 56

c) 2 d) 63

22) Solve. $\frac{a}{2} = 20$.

a) 22 b) 10

c) 18 d) 40

23) What is the rule to find the value of the missing term in the table?

Position	1	2	3	4	*n*
Value of Term	4	5	6	7	■

a) $n + 2$ b) $3n$

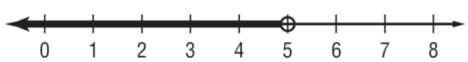
c) $n + 3$ d) $\frac{3}{n}$

24) Which inequality is graphed?

a) $x \leq 13$ b) $x \geq 13$

c) $x < 13$ d) $x > 13$

25) Which of the following inequalities has the solution shown below?



a) $5n \geq 25$ b) $5n > 25$

c) $5n \leq 25$ d) $5n < 25$

26) Solve the inequality $x + 3 \leq 7$.

a) $x \leq 4$ b) $x \geq 10$

c) $x \geq 4$ d) $x \leq 10$

27) Solve the inequality $\frac{y}{3} > 9$

a) $y > 3$ b) $y > 27$

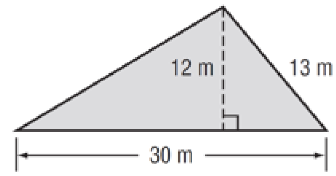
c) $y < 3$ d) $y < 27$

28) What is the height of a parallelogram with base 5 meters and an area of 150 square meters?

a) 30 m b) 50 m

c) 750 m d) 100 m

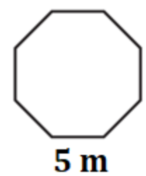
29) Aisha is designing a triangular-shaped cardboard with a height of 15 centimeters and an area of 135 square centimeters. What is the length of the base of the cardboard?



a) 9 cm b) 120 cm

c) 18 cm d) 2,025 cm

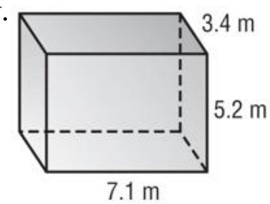
30) The regular octagon shown is enlarged so that its sides are 4 times as large. What effect does this have on the perimeter?



a) The perimeter is 2 times greater. b) The perimeter is 4 times greater.

c) The perimeter is 16 times greater. d) The perimeter stays the same.

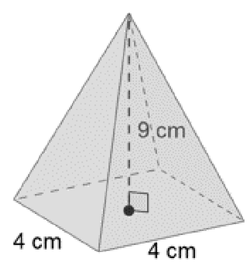
31) Find the volume of the rectangular prism. Round to the nearest tenth if necessary.



a) 251.1 m^3 b) 125.5 m^3

c) 214 m^3 d) 25 m^3

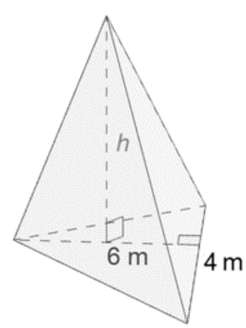
32) Find the volume of the square pyramid.



a) 24 cm^3 b) 144 cm^3

c) 230 cm^3 d) 48 cm^3

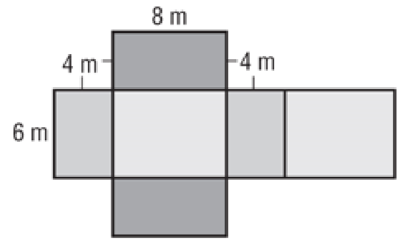
33) Find the height of the triangular pyramid if its volume is 40 m^3.



a) 6 m b) 10 m

c) 3 m d) 40 m

34) Find the surface area of the solid with the given net.



a) 768 m^2 b) 192 m^2

c) 208 m^2 d) 104 m^2

35) The table shows the prices of pens in a store. What is the median price for the pens?

Price of Pens (AED)					
40	37	25	35	29	43
34	26	39	43	51	47
35	27	45	28	50	43

a) AED 38 b) AED 43

c) AED 25 d) AED 29

36) What is the mean of the data shown in the table?

38	50	32	42
50	32	10	50

a) 38 b) 42

c) 40 d) 50

37) Which of the following is an appropriate display to show the average price of a car over the last 10 years?

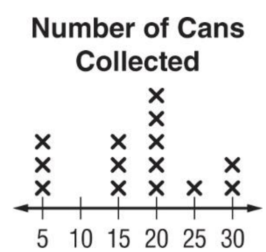
a) bar graph b) line graph

c) circle graph d) histogram

38) The line plot below shows the number of cans collected by the student council. Which of the following describes the data?

a) symmetric b) peak at 15

c) not symmetric d) cluster at 10



Part II. Answer the following questions. Show your work.

39) Compare. Use <, or >.

a) 5.5 and $\frac{17}{3}$

b) -3.5 and $-\frac{13}{4}$

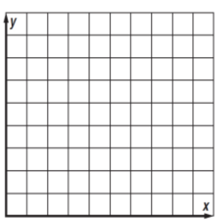
40) Four friends bought tickets to the school play. It cost them a total of AED 84. Write and solve an equation to find the cost of each ticket.

41) Given the equation $y = 2x$.

a) Complete the function table.

Input (x)	**$2x$**	**Output (y)**
2		
3		
4		

b) Graph the equation.

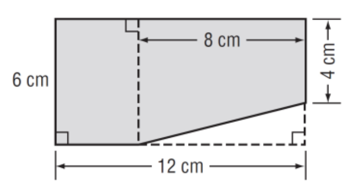


42) A gym charges AED 50 registration fee plus an additional AED 70 for each month that you attend.

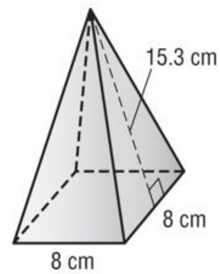
a) Write an equation that could be used to find the total cost y for someone to attend the gym for any number of months x.

b) How much will you pay if you attend 7 months?

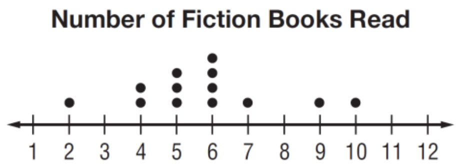
43) Find the area of the figure at the right.



44) Find the surface area of the given square pyramid.



45) Use the dot plot below.



a) What is the mean of the data? Round to the nearest tenth.

b) What is the mode of the data?

c) What is the median of the data?

46) The table shows the number of hours Mahra spent sleeping each night for 12 nights.

a) What is the mean of the data? Round to the nearest tenth.

b) What is the mode of the data?

Hours Spent Sleeping			
8	6	7	7
10	8	8	10
8	8	5	7

47) Make a line plot of the data.

Number of Pets					
0	6	1	2	0	1
2	0	5	2	1	2
1	1	4	1	1	2