Remember: an ordered pair looks like this

(2, 3)
↓ always x
↳ always y

Unit 6

Linear Relations

LINEAR EQUATIONS and Graphing

Review:

A **relationship** is a pattern formed by two sets of numbers.

There are many different ways to communicate a relationship:

- **In words**
- **Using an algebraic expression**
- **Using a table of values**
- **Graphing**

We call a relationship a **linear relation** if the set of points lie in a straight line, and if the consecutive values in a table of values always change by the same amount.

After making a table
If x shows a pattern AND Y shows a pattern ⇒ LINEAR RELATION

Practice:

1. For each of the following statements, write a mathematical expression:

a. Double the length, increased by 2

b. 4 less than a number

c. Candies shared equally among 5 students

d. A gain of 10 points from yesterday

e. 3 times as many seeds

- To solve linear equation problems:

Remember:

1. Use $x = 0, 1, 2, 3$
2. Make a table. Substitute each value of x on the equation.

$y = 4x - 1$ →

x	y
0	-1
1	3
2	7
3	11

(+4, +4)

x goes up by 1
y goes up by 4

Because both have a pattern, this is a linear relation

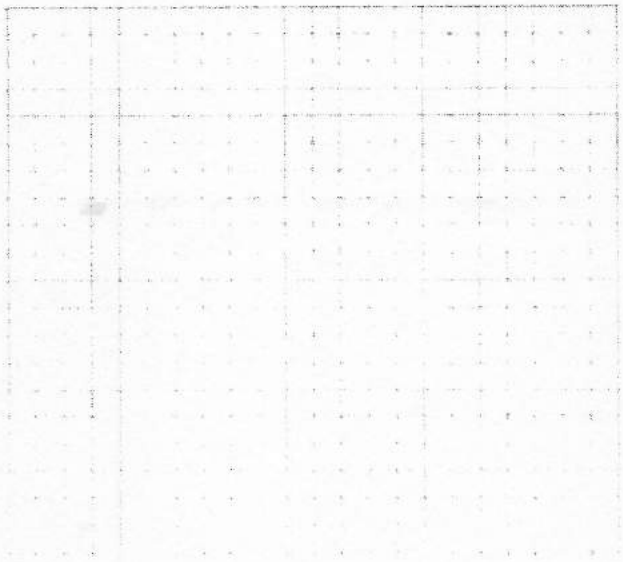
2. The cost to rent a banquet hall is $50, plus $2 per person.

a. Complete a table of values for this data:

# guests	0	10	20	30	40	50
cost ($)						

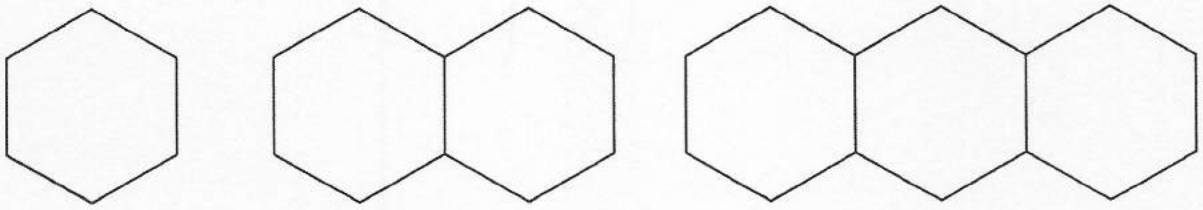
b. Use an expression to show the relationship:

c. Create a graph.



d. Is the relationship linear? Explain how you know.

3. The regular hexagons in the diagrams are made from toothpicks.



a. Draw the next two diagrams.

b. Express the pattern in words

c. Use an expression to show the pattern

d. Complete a table of values

4. Express each of the following mathematical expressions in *words*.

a. $x + 17$

b. $25 - x$

c. $2(x + 2)$

d. $y + 3y$

e. $20n$

Unit 6

Linear Relations

GR 8 REVIEW LINEAR RELATIONS

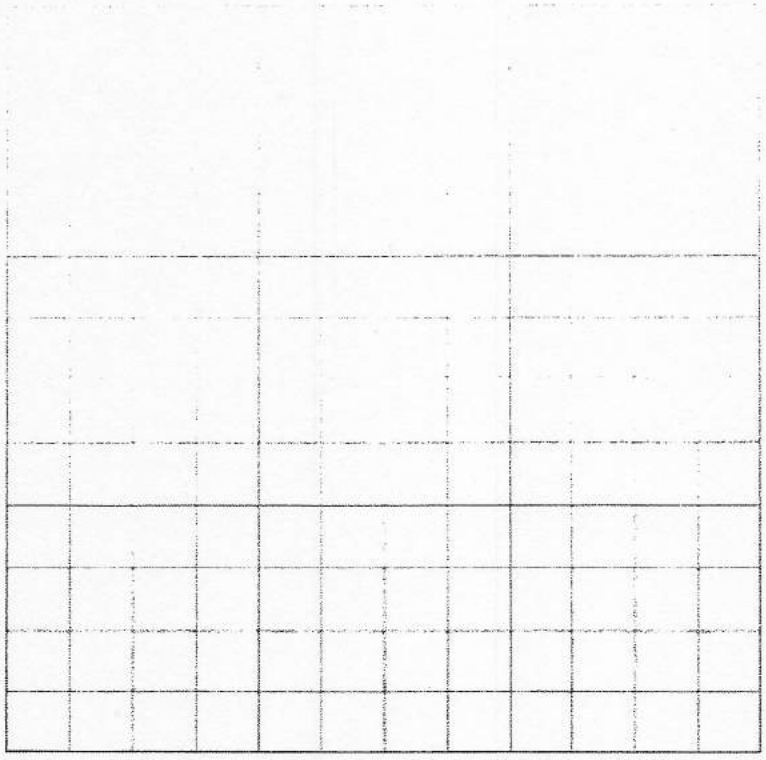
KEY WORDS:
- relationship
- linear relation
- equation
- table of values
- variable
- expression
- formula

1. Equipment rentals at a ski shop require a one-time fee of $65 plus an additional daily charge of $20. The cost is represented by the linear relation , where c is the total cost and n is the number of days.

a) Complete the table of values for up to five days of rentals.

Number of Days, n	**Cost, c ($)**
1	
3	
	145
5	165

b) Graph the ordered pairs.



2. The cost of a TV repair is \$25/h plus a house-call fee of \$65.
a) Complete the table of values for up to five hours work.

Number of Hours, *n*	**Total Cost, *c* (\$)**

b) If a repair takes two hours, what will the total cost be?

3 **a)** Follow the pattern to complete the table of values below.

Term, *t*	1	2	3	4	5	6	7	8	9	10
Value, *v*	6	12	18	24						

b) Is this a linear relation? Explain how you know.

4. Ryan lives near a golf course. As his summer job, he decides to sell packages of golf balls.

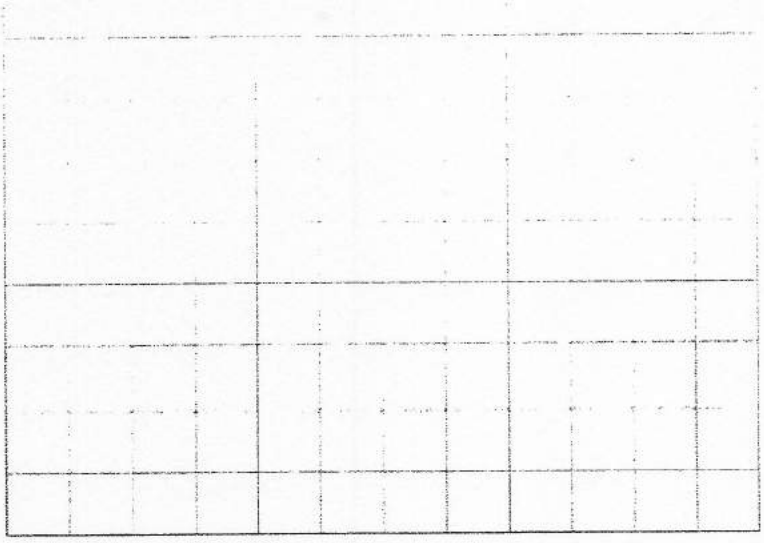
a) Complete this table of values.

Number of Golf Balls, g	Number of Packages, p
3	1
6	2
	3
12	
	5

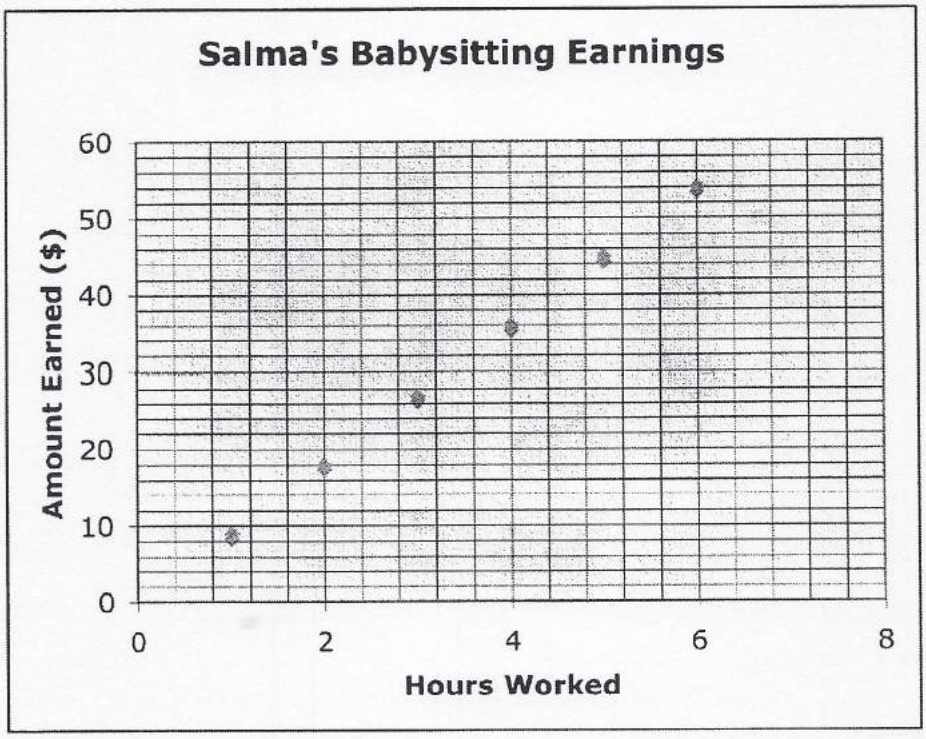
b) Write a linear relation to describe the pattern in this table.

c) Describe the relationship in words.

d) Graph the values from the table.



5. This graph shows Salma's earnings from babysitting:



a. Write an expression to show the relationship of Salma's earnings.

b. If Salma works for 9 hours, how much money will she make?

c. If Salma earns $40.50, for how long has she worked?

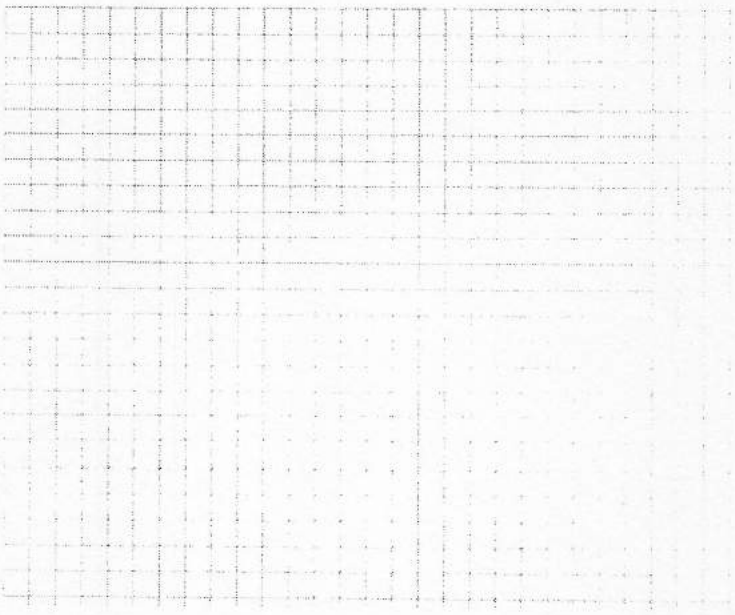
6. Samantha sells her homemade knitted toques at the local flea market. She makes $10 for every toque that she sells. She pays $60 to rent a table at the market.

a. Write an expression to show how much money Samantha makes after a day at the flea market.

b. If Samantha sells 5 toques, how much money will she make?

7. Graph these linear relations on the same grid. Use a different colour for each relation. Graph 5 points for each relation.

a. $3n + 2$
b. $3n - 1$
c. $3n$



Remember: Both X an Y have to have a constant pattern to make the equation a Linear equation

GRADE 8 MATH - LINEAR EQUATIONS

Unit 6

KEY WORDS. •equation •linear equation •variable
•constant •distributive property
•numerical coefficient

1. Todd is solving the equation $t + 14 = 28$. What is wrong with his solution?

$$t + 14 = 28$$
$$t + 14 - 28 = 28 + 28$$
$$t - 14 = 0$$

To solve equations:
- you want to make sure the variable ends up by itself on one side of the equal sign.
- To do that, you must perform the opposite operation of whatever you want to get rid of

Adding ⟷ (opposite) Subtracting
Multiplying ⟷ (opposite) Dividing

2. Solve the equation. Verify your answer.

$$2x + 3.5 = 11.5$$

- whatever you do on one side, you MUST do on the other side

1. get rid of the +3.5:
$2x + 3.5 - 3.5 = 11.5 - 3.5$
(this eliminates 3.5). So:
$2x = 8$
2. Eliminate the 2 by the x. Since the 2 is multiplying the x, you must divide by 2 → $\frac{2}{2}x = \frac{8}{2}$ So
$x = \frac{8}{2} = 4$

3. Using tiles to model the equation $3x + 2 = 11$.

4. A rectangular garden has a length of 24 m and a perimeter of 92 m. Write and solve an equation to determine the width, w. Verify your solution.

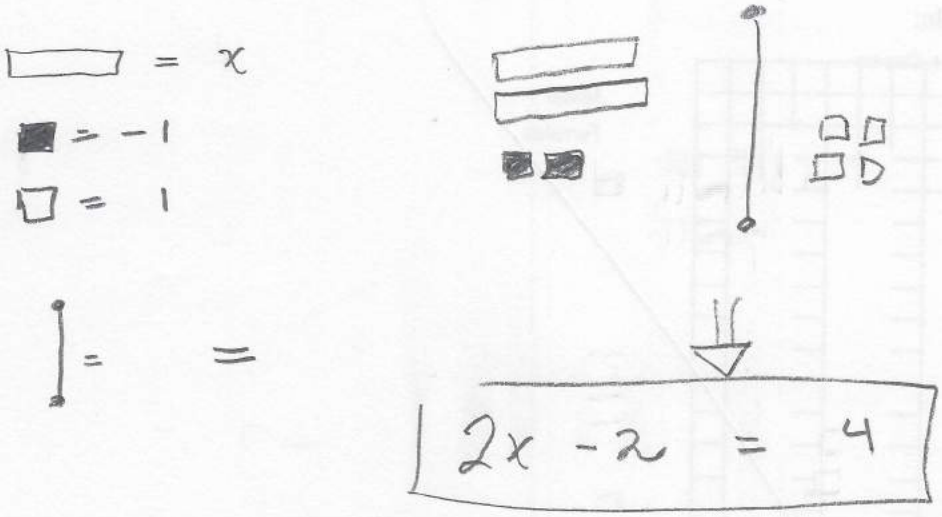
5. If the perimeter of a square is known, the formula for the side length, s, is $s = \frac{p}{4}$. If the perimeter of a square field is 12 km, what is the length of one side of the field? Verify your solution.

6. Solve using symbols. $\frac{x}{5} = 12$

7. Solve using symbols. $5(x - 1) = 35$

8. Model and solve with tiles. $\frac{x}{2} - 1 = 18$

• In a graph representation of an equation:



$$2x - 2 = 4$$

Then, solve the equation

Unit 7

May 05, 2014

Lesson 7.1

Choosing an Appropriate Graph

May 2

Curriculum Focus: Identify the advantages and disadvantages of different types of graphs.

Get Started:

Name as many graph types as you can...

bar, circle, pictograph, line, double bar

1. Why might someone use a circle graph?
   shows PERCENT
2. Why might someone use a bar graph?
   shows COMPARISON
3. Why might someone use a line graph?
   shows CHANGE OVER TIME
4. Why might someone use a pictograph instead of a bar graph?
   * more visually appealing; easily read by all.

Investigate:

Look at the graphs found on p. 382.

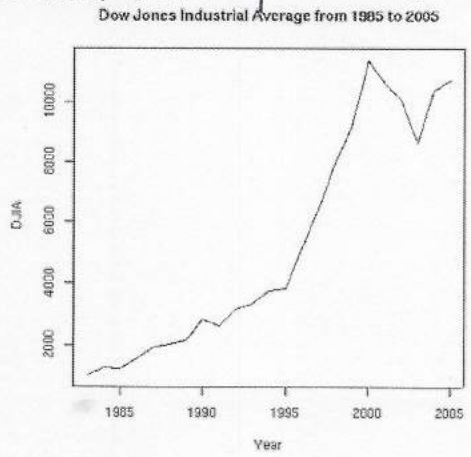
1. What kind of graph is Graph A?
   Bar Graph
2. What does Graph A represent?
   COMPARISON of skateboard sales
3. What kind of graph is Graph B?
   Line Graph
4. What does Graph B represent?
   CHANGE in skateboard sales OVER TIME
5. What kind of graph is Graph C?
   Circle Graph
6. What does Graph C represent?
   PERCENT of skateboard sales
7. Which 2 months had the greatest skateboard sales? What graph did you use? June, July

May 05, 2014

Connect:
Line Graphs

Line graphs display change over time.

Advantages:
. easy to draw and to read
. best shows data gathered over time
. can be used to estimate data between data points.
. Can be used to make predictions

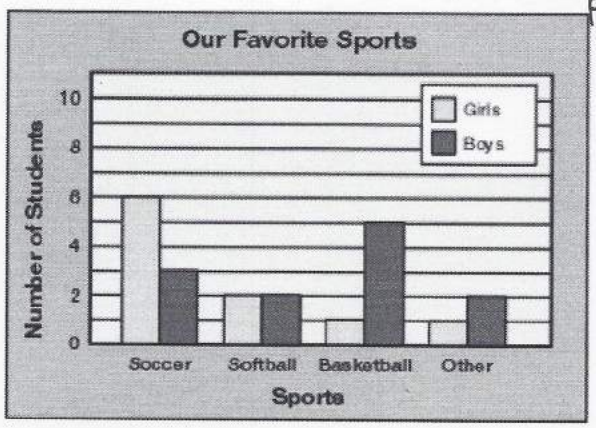


Connect:
Double Bar Graphs

Double Bar graphs display two sets of data that can be compared.

Characteristics:
. easy to draw and to read
. can be used to directly compare two sets of data
. can be used to show discrete data. (Data that can be counted.)
. may be difficult to read accurately depending on the scale.

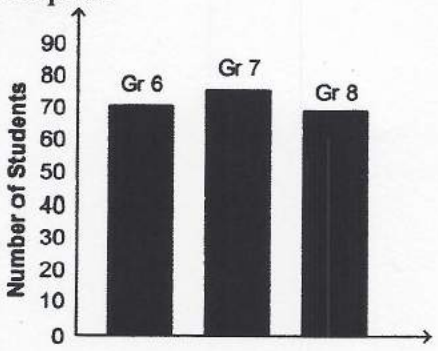
You can count people in survey.



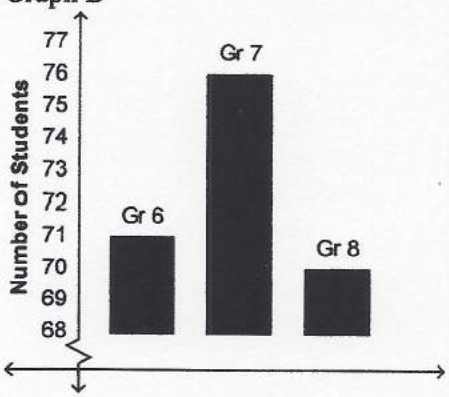
2. Not showing the complete scale of data can exaggerate or subdue the impression of the data.

ie. These 2 graphs show the number of students getting an average mark of 80 or higher in each grade at Glenwood Middle School. Which suggest an exaggerated difference in the resulting marks? (Notice the vertical axis is not complete.)

Graph A



Graph B

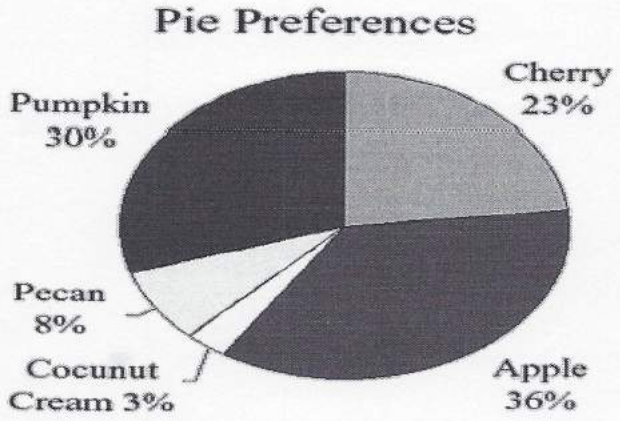


May 05, 2014

Connect:
Circle Graphs

Circle graphs display percent.

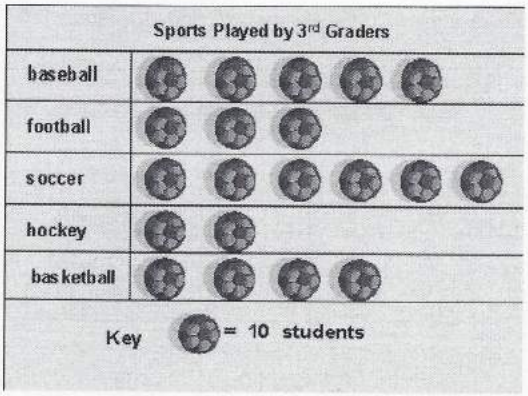
Characteristics:
. show parts of a whole
. size of the sectors can be used to compare responses
. doesn't show the number of people involved in the survey
. difficult to draw accurately



Connect:
Pictographs

Pictographs display comparisons through pictures.

Characteristics:
. the lengths of the rows of symbols give immediate comparison of responses
. the graph is visually appealing
. they could be difficult to draw; a lot of different symbols



Examples:

1. Three students surveyed grade 8 students in their school. They asked, "How many times did you use the vending machine last week: 0 times, 1-3 times, 4-9 times, or 10 or more times?"

Amrit displayed the results on a circle graph.
Fred used a bar graph.
Stella used a pictograph.
Look at the graphs on page 384.

a) What are the strengths and limitations of each graph?

Circle - visually appealing, easy to read, shows %
- doesn't show discrete data.
Bar - easy to read + make, show comparison
Pictograph - easy to read; visually appealing. Time consuming to make

b) Which graph is appropriate? Justify your answer.

Bar - show comparison + easy to make.

Examples:

2. The table shows the favorite types of video games of the grade 8 students at GHP.

Type	Number of Students
Action	15
Role Playing	10
Arcade	4
Strategy	7
Simulation	11
Other	3

Graph these data. Justify your choice of graph.
What are the advantages and disadvantages of the graph you drew?

Advantages:
easy to draw
easy to read
shows discrete data

Disadvantages:
scale on y-axis is a little unclear.

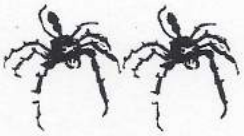
Pictograph

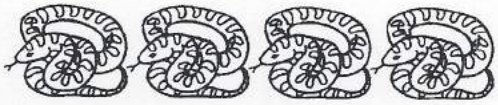
8A Class – Favorite Pet Choice

Lizard 

Fish 

Frog 

Spider 

Snake 

[Each picture represents one student's vote.]

Computer Generated Graphs : To learn to quickly how to create computer generated graphs try using the "Microsoft Excel" spreadsheet. Make a table on the spreadsheet with the desired categories and data, then drag the mouse across and highlight the cells of the table created. Click on the "Chart Wizard" button in the top tool bar, which looks like a small bar graph. Then follow the suggested procedure but do not be afraid to experiment with the settings to find out the various options.
(Also refer to Textbook – Math Sense 8 , published by Pearsons, 2008, page 391.)

Remember: • For independent (or different) events, you must multiply all the probabilities together

Unit 1

GRADE 8 MATH REVIEW PROBABILITY

Probability = $\frac{\#\text{ favourable outcomes}}{\#\text{ total possible outcomes}}$

KEY WORDS: •independent events •favorable outcome
•probability •simulations

1. Draw a table to show all of the possible outcomes when a card is drawn and the die is tossed. What are the chances of randomly rolling a 2 and drawing the 2 of clubs?

These two events are independent. Therefore, you must multiply

Chance of drawing a 2 : 2 of 5 or 2:5 or $\frac{2}{5}$

Chance of Rolling a 2 : $\frac{1}{6}$ or 1 of 6

$$\frac{2}{5} \times \frac{1}{6} = \frac{2}{30} = \frac{1}{15}$$

1 of 15

2. Two six-sided dice are rolled. What is the probability of rolling two numbers that have a sum of five?

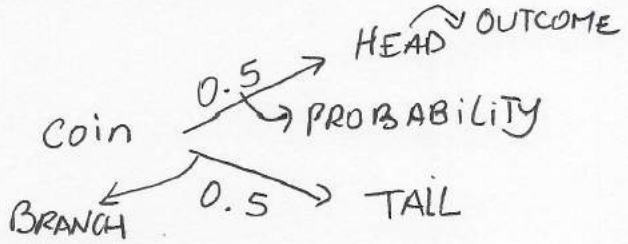
3. Scott's sock drawer contains one pair of green socks, four pairs of white socks, and two pairs of black socks. His shirt drawer contains three white T-shirts, two blue T-shirts, and one green T-shirt. What is the probability of pulling out a pair of white socks and a white T-shirt?

Unit 7

Probability Tree Diagrams

Calculating probabilities can be hard, sometimes we add them, sometimes we multiply them, and often it is hard to figure out what to do ... **tree diagrams to the rescue!**

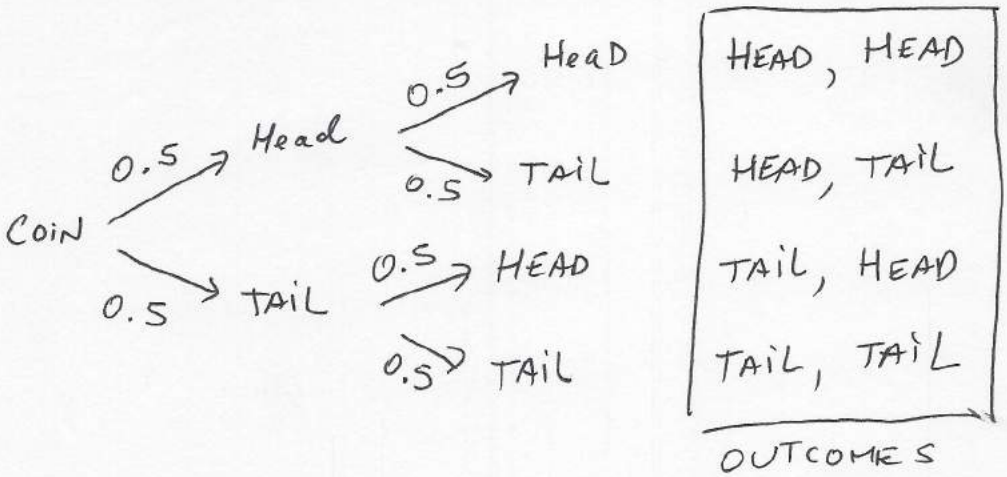
Here is a tree diagram for the toss of a coin:



There are two "branches" (Heads and Tails)

- The probability of each branch is written on the branch
- The outcome is written at the end of the branch

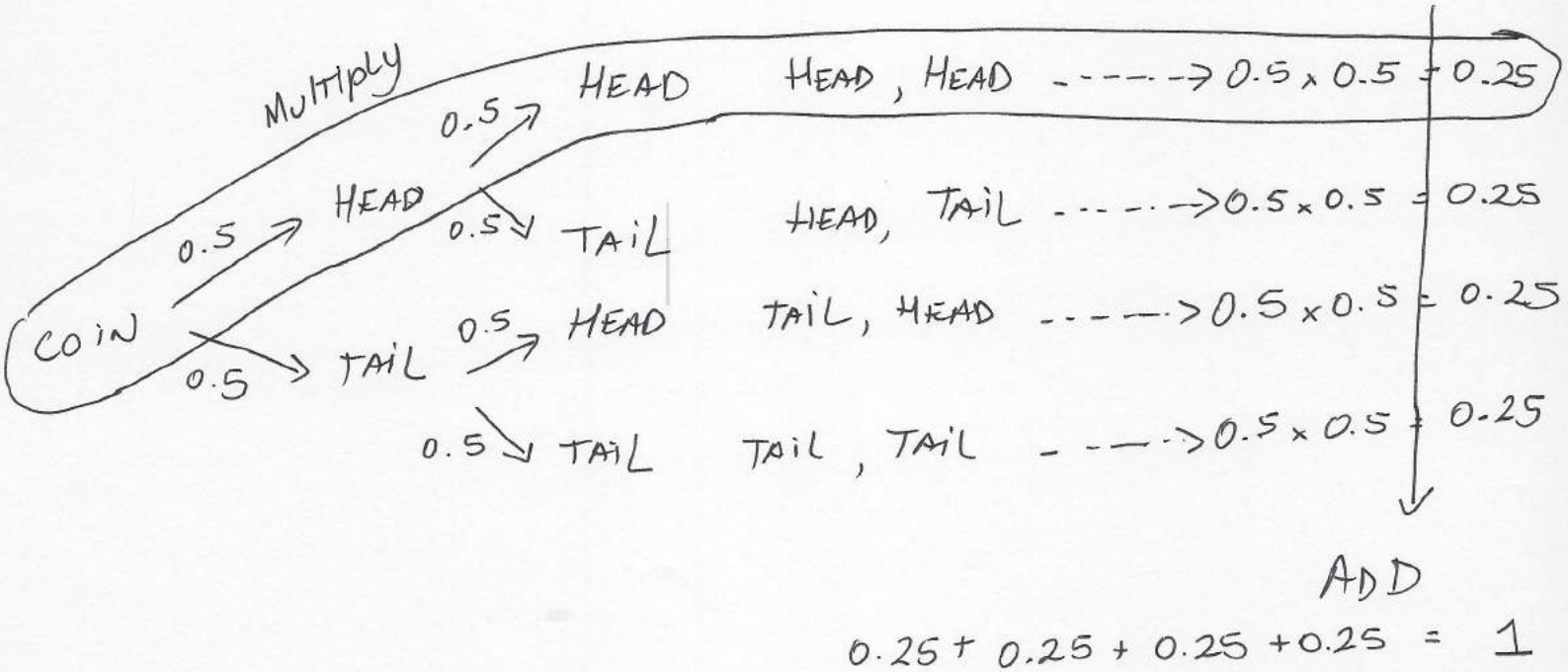
We can extend the tree diagram to two tosses of a coin:



How do we calculate the overall probabilities?

- We **multiply** probabilities **along the branches**

- We **add** probabilities down **columns**



Now we can see such things as:

- The probability of "Head, Head" is 0.5×0.5 = **0.25**
- All probabilities add to **1.0** (which is always a good check)
- The probability of getting at least one Head from two tosses is 0.25+0.25+0.25 = **0.75**
- ... and more

That was a simple example using independent events (each toss of a coin is independent of the previous toss), but tree diagrams are really wonderful for figuring out dependent events (where an event **depends on** what happens in the previous event) like this example:

Example: Soccer Game

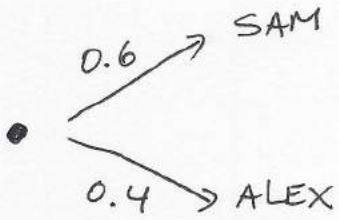
You are off to soccer, and love being the Goalkeeper, but that depends who is the Coach today:

- with Coach Sam the probability of being Goalkeeper is **0.5**
- with Coach Alex the probability of being Goalkeeper is **0.3**

Sam is Coach more often ... about 6 out of every 10 games (a probability of **0.6**).

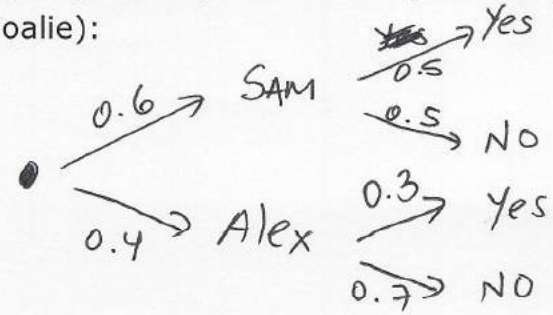
So, what is the probability you will be a Goalkeeper today?

Let's build the tree diagram. First we show the two possible coaches: Sam or Alex:



The probability of getting Sam is 0.6, so the probability of Alex must be 0.4 (together the probability is 1)

Now, if you get Sam, there is 0.5 probability of being Goalie (and 0.5 of not being Goalie):

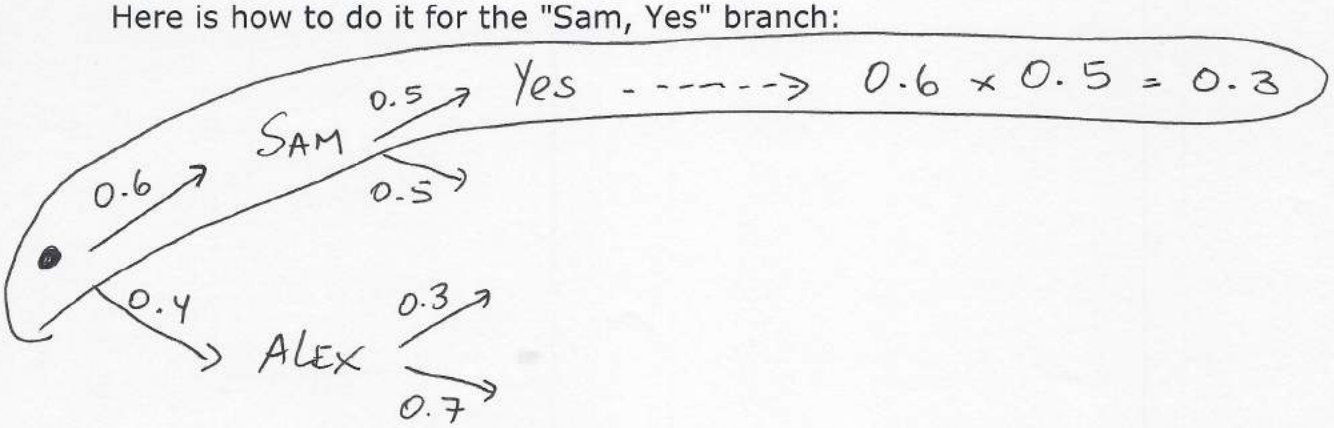


If you get Alex, there is 0.3 probability of being Goalie (and 0.7 not):

(See above)

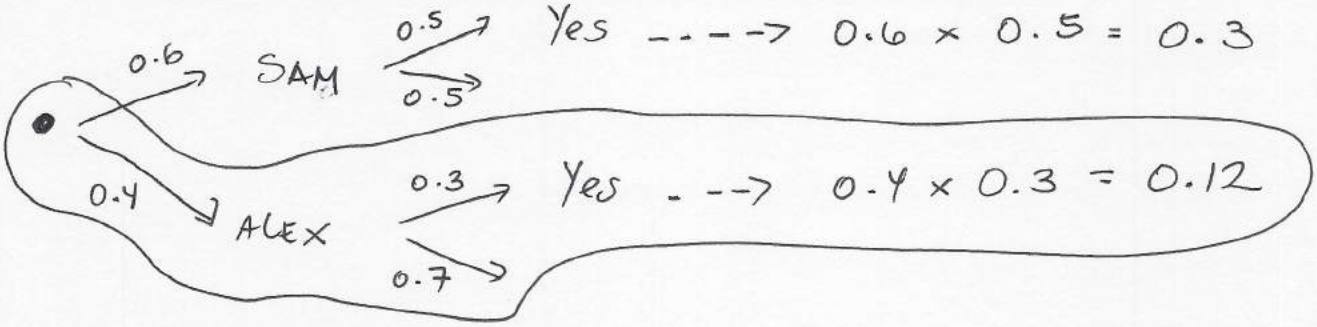
The tree diagram is complete, now let's calculate the overall probabilities. This is done by multiplying each probability along the "branches" of the tree.

Here is how to do it for the "Sam, Yes" branch:



(When we take the 0.6 chance of Sam being coach and include the 0.5 chance that Sam will let you be Goalkeeper we end up with an 0.3 chance.)

But we are not done yet! We haven't included Alex as Coach:



A 0.4 chance of Alex as Coach, followed by an 0.3 chance gives 0.12.

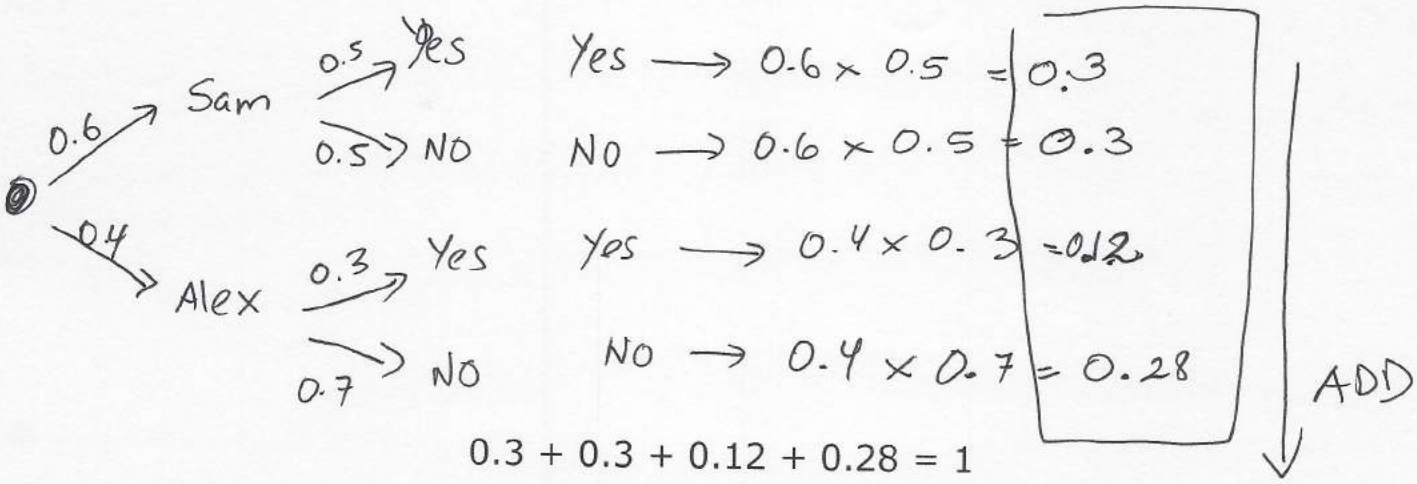
Now we add the column:

0.3 + 0.12 = **0.42 probability** of being a Goalkeeper today

(That is a 42% chance)

Check

One final step: complete the calculations and make sure they add to 1:



$$0.3 + 0.3 + 0.12 + 0.28 = 1$$

Yes, it all adds up.

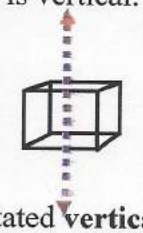
Conclusion

So there you go, when in doubt draw a tree diagram, multiply along the branches and add the columns. Make sure all probabilities add to 1 and you are good to go.

Unit 8 Grade 8

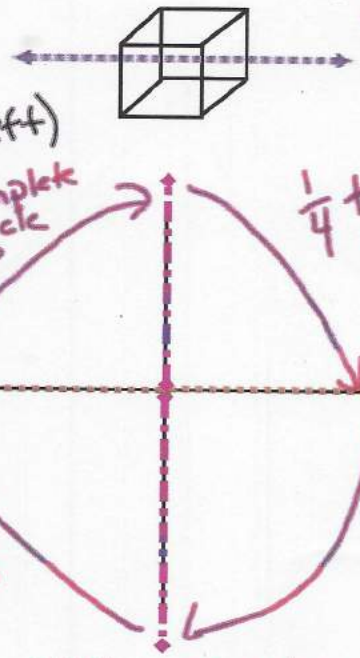
8.2 Drawing Views of Rotated Objects

An object can be rotated **horizontally**, which means you are turning it (either clockwise or counter-clockwise), but the object still stays right side up. When an object is rotated horizontally, the **axis of rotation** is vertical.



turned right or left
↓ clockwise
↓ counter-clockwise

An object can be rotated **vertically**, which means that you are turning it either towards or away from you, so the object turns upside down. When an object is rotated vertically, the **axis of rotation** is horizontal.



Pg. 444 # 3, 4, b, 7, 9

90°

3a) 90° counterc of 270° Clockwise

4a) Front B, Top: E, L side: a, R side: g

Name _____ Date _____

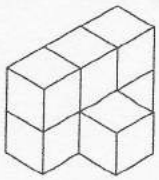
Master 8.26

Extra Practice 1

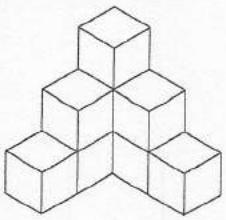
Lesson 8.1: Sketching Views of Objects

1. Sketch the top, front, and side views of each object.

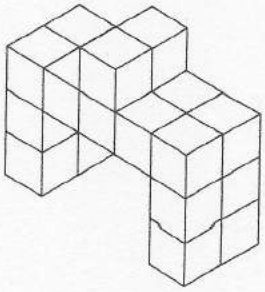
a)



b)

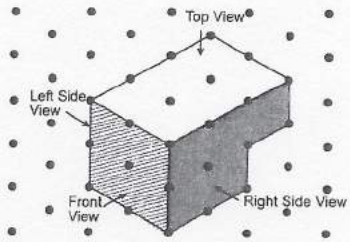


c)

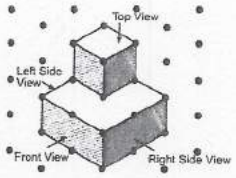


2. Sketch the top, front, and side views of each object drawn on isometric dot paper.

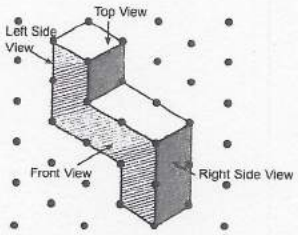
a)



b)



c)



3. Use linking cubes.
Make the letter E.
Sketch the front, top, and side views of your model.

4. Sketch the top, front, and side views of each object at home or in the classroom.
a) a tissue box
b) a CD case
c) a cereal box

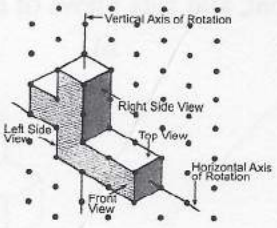
Name _____ Date _____

Master 8.27

Extra Practice 2

Lesson 8.2: Drawing Views of Rotated Objects

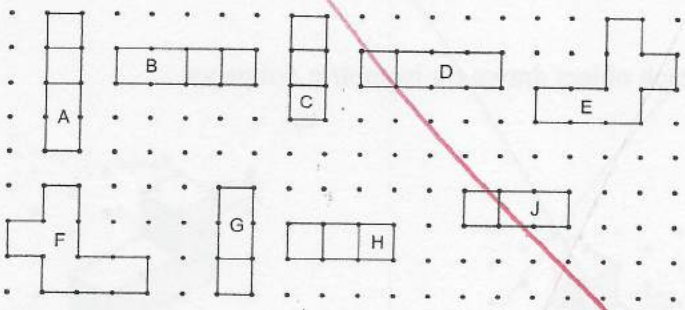
1. Build this object.
Rotate the object as describe below,
then match each view to the front, top,
and side views of the rotated object.
A lettered view can be used more than once.



a) a horizontal rotation of 90° clockwise about the vertical axis shown

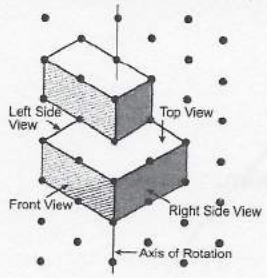
b) a horizontal rotation of 180° clockwise about the vertical axis shown

c) a vertical rotation of 90° away from you about the horizontal axis shown



2. Suppose the object in question 1 was rotated horizontally 180° counterclockwise about the vertical axis shown. How would the views of the object after the rotation compare to those in question 1b? Justify your answer.

3. Here is an isometric drawing of an object.



The object is rotated horizontally 270° clockwise about the axis shown.

a) Draw the front, top, and side views of the object after the rotation.

b) Describe a different rotation that will have the same views as the ones you drew in part a.

4. Use the object in question 3.
Suppose the object is rotated 270° counterclockwise.
Will the new views of the object be the same as those drawn in question 3a?
If your answer is yes, explain how you know.
If your answer is no, draw the new views.

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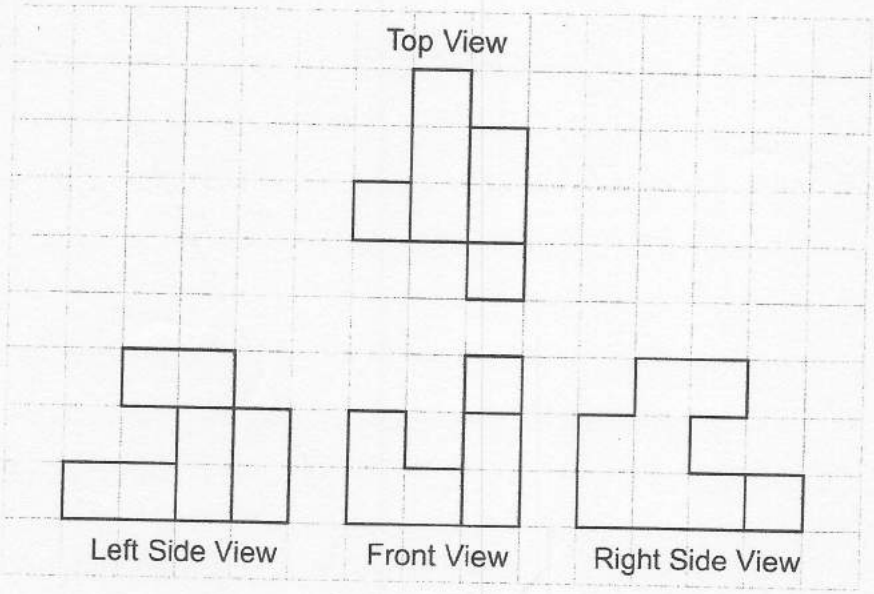
Extra Practice 3

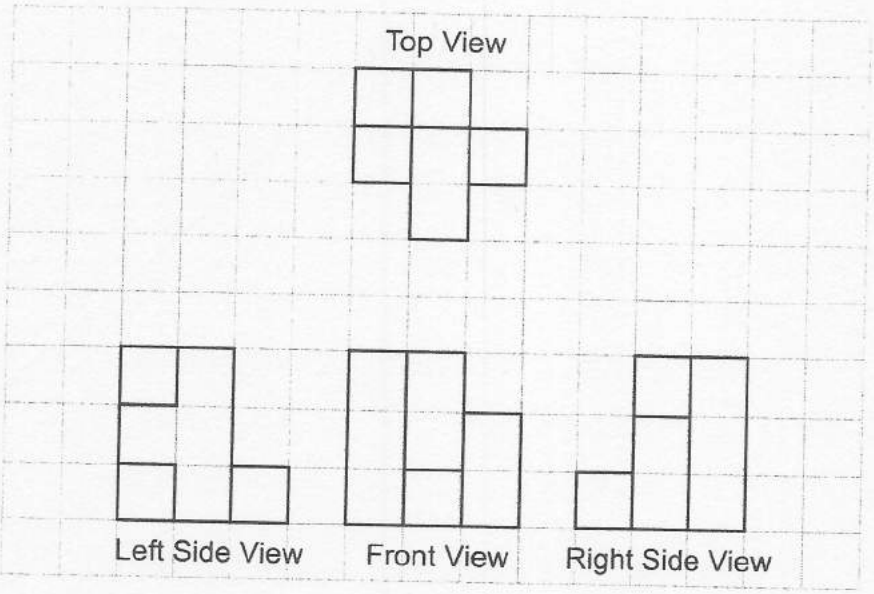
Lesson 8.3: Building Objects from Their Views

1. Use linking cubes to build an object for each set of views below.

a)



b)



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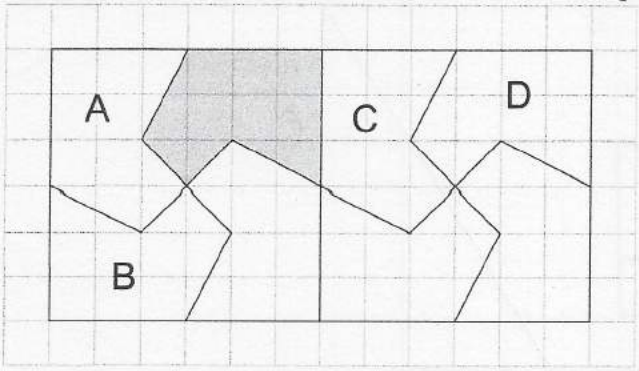
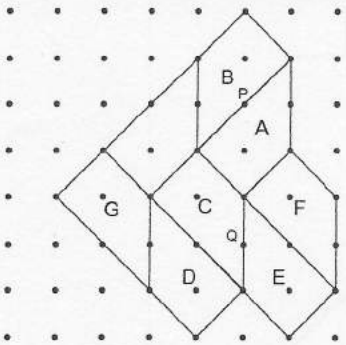
Extra Practice 4

Lesson 8.4: Identifying Transformations

1. Start with the shaded shape.
Use transformations to describe how to create Shapes A, B, C, and D.

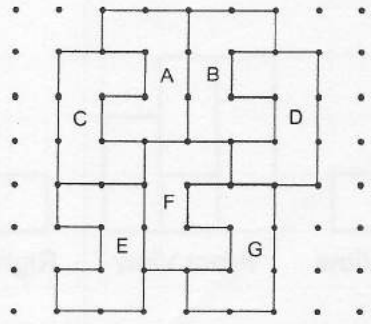


2. Use this design.
Match each transformation to a transformation image.



a) Rotate Shape A 180° about point P.
b) Translate Shape C 2 units left.
c) Rotate Shape D 180° about point Q.
d) Translate Shape G 4 units right.

3. Use the design to the right.
Identify each transformation.
a) Shape D is the image of Shape C.
b) Shape E is the image of Shape G.
c) Shape C is the image of Shape E.
d) Shape F is the image of Shape C.
e) Shape A is the image of Shape B.



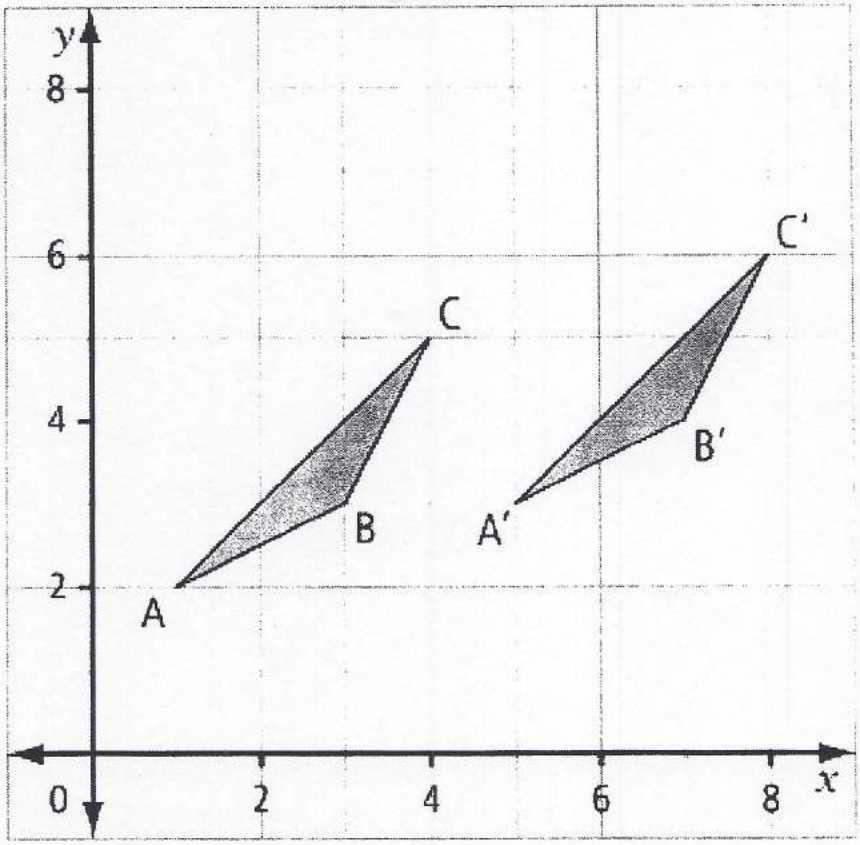
GR. 8 MATH REVIEW TESSELLATIONS

KEY WORDS •vertices •coordinates •reflection
•translation •rotation •image

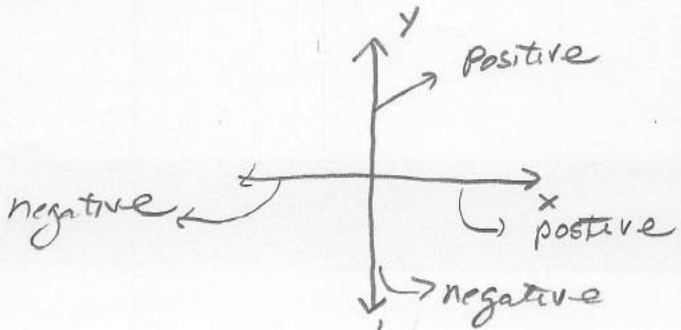
1. Find the new coordinates for each point after the given translation.

	Point	Translation
a)	A(1, 1)	3 units right
b)	B(3, 1)	1 unit down
c)	C(4, 2)	1 unit right and 2 units up

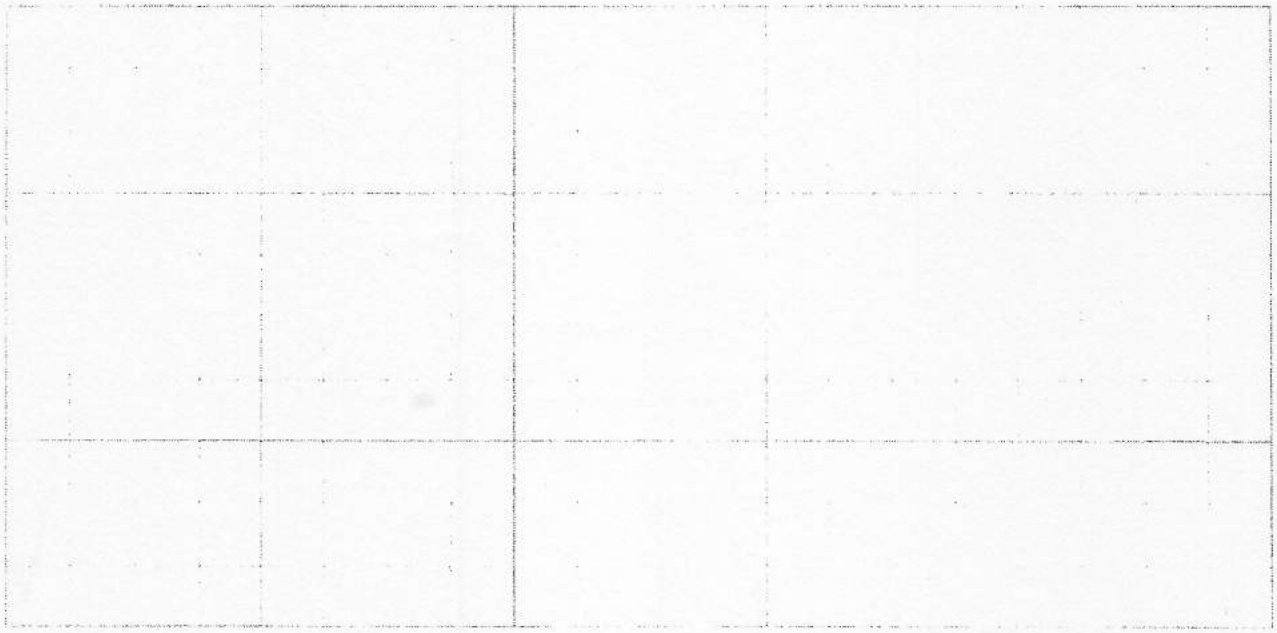
2. Describe the transformation that creates the new image $\Delta A'B'C'$.



Remember

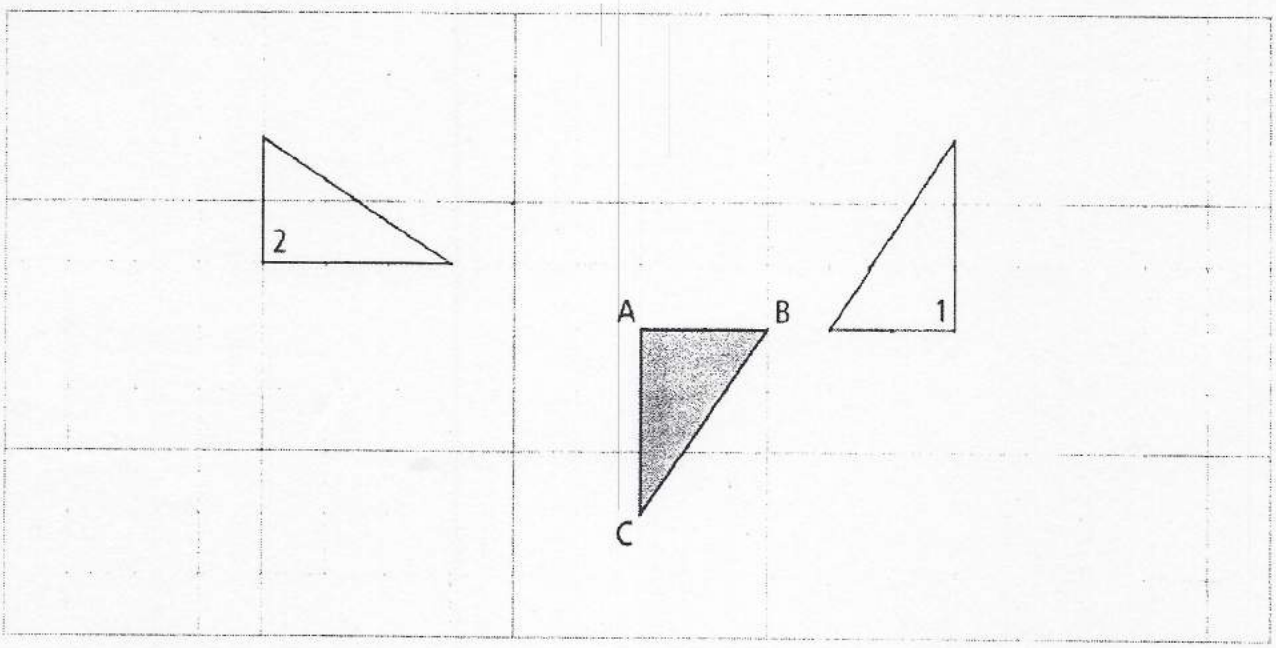


3. A figure has vertices at A(1, 5), B(2, 5), C(2, 4), D(3,4), E(3, 3), F(4,3), G(4,2), and H(1, 2). Draw the figure on the coordinate grid. Identify the image, and draw the image of the figure after a reflection along the mirror line. The mirror line is formed by joining the points (5, 6) and (5, 1).



4. Which capital letters of the alphabet have identical images after a reflection? Identify each letter and explain how to reflect it to get an identical image. Also identify the letters that do not reflect.

5. Figure 1 and Figure 2 are transformations of ΔABC. Identify the type of transformation for each.



Types of Transformations

Reflection: A mirror image

- If Reflected on the x-axis, only the y coordinates change

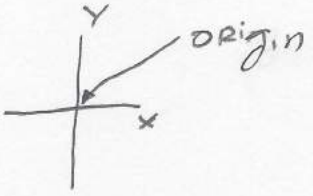
  $(2, 3) \longrightarrow (2, -3)$

- If Reflected on the y-axis, only the x coordinates change

  $(4, -3) \longrightarrow (-4, -3)$

Rotation: (figure changes)

- about the origin means



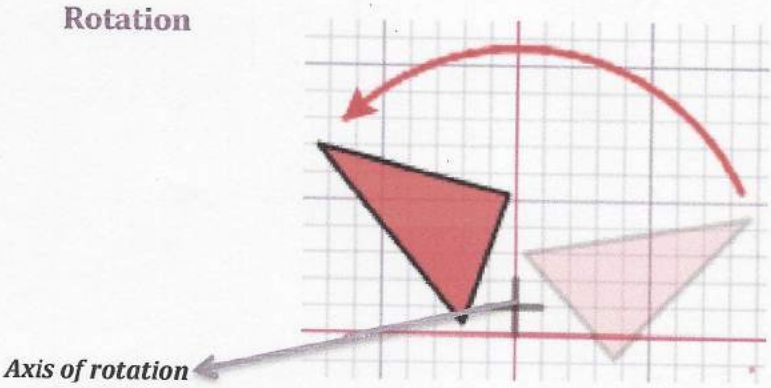
- Rotation of 90° or 180°
  - 90° makes an "L"
  - 180° the inverse

Translation: - the figure does not change. It <u>just</u> moves!

Transformations in Geometry

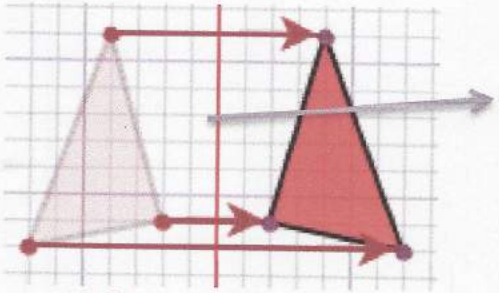
These are Transformations:

Rotation



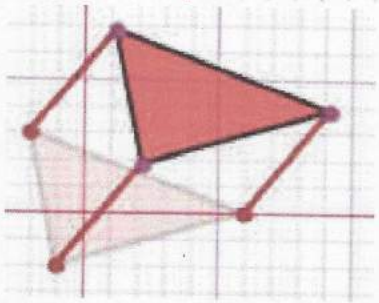
Turn!

Reflection



Flip!

Translation



Slide!

Remember: An **"ordered" pair** is a set of coordinates that describe the place of a point on the Cartesian plane. It is always written as ***(x, y)***. For example, if (4, 8) describes point A, it means that point A is to be found at ***x=4 and y=8.***

ROTATION:

- ✓ The figure rotates from a fixed point (called the ***axis of rotation***)
- ✓ The **ORIGIN** is where the x- and the y- axis meet
- ✓ The end result of the transformation is *a rotated figure*
- ✓ You MUST:
  - Specify where the fixed point of rotation is *(Example: "about the origin"; "about x=2, etc.)*
  - Specify whether the rotation is **CLOCKWISE or ANTI-CLOCKWISE.**
  - Specify how many degrees the figure rotates *(Example: 90 degrees clockwise, etc.)*

REFLECTION:

- ✓ A reflection is a "mirror image"
- ✓ The result of this transformation is a *flipped image*
- ✓ You **MUST**:
  - Specify where the "line of reflection" is. Think of the *line of reflection* as **where you put the reflecting mirror.**
  - The distance of a vertex in the original figure to the line of reflection is EQUAL to the distance between the line of reflection and the same, corresponding vertex on the reflected figure.

TRANSLATION:

- ✓ To "translate" means to move
- ✓ The resulting transformation looks **EXACTLY like the original figure,** but "moved" to a different
- ✓ You can translate:
  - Up
  - Down
  - Right
  - Left
- ✓ You **MUST** specify:
  - Whether the translation happens **UP (U), DOWN (D), RIGHT (R), or LEFT (L)**
  - **How many units it is moved**
  - Examples:
    1. "2R" translation means the original shape is moved 2 units to the right.
    2. "3U" means the original shape is moved 3 units up.