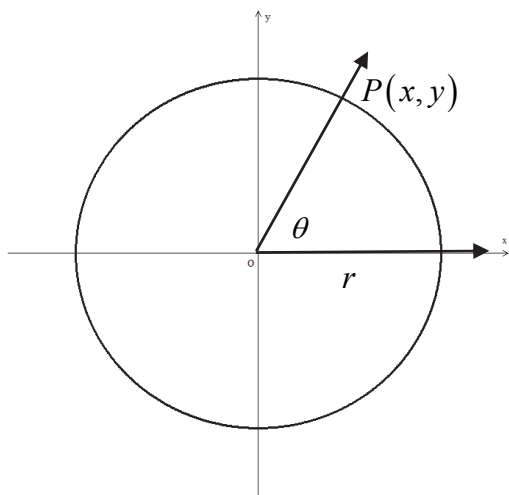


**Honors Algebra 2 B**  
**Semester Exam Review**  
**2015–2016**

## Exam Formulas



For the circle  $x^2 + y^2 = r^2$ :

Circumference =  $2\pi r$

If  $\theta$  is an angle in standard position, whose terminal ray passes through  $P(x, y)$  on the circle, then:

$$\sin \theta = \frac{y}{r}$$

$$\cos \theta = \frac{x}{r}$$

$$\tan \theta = \frac{y}{x}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$180 \text{ degrees} = \pi \text{ radians}$$

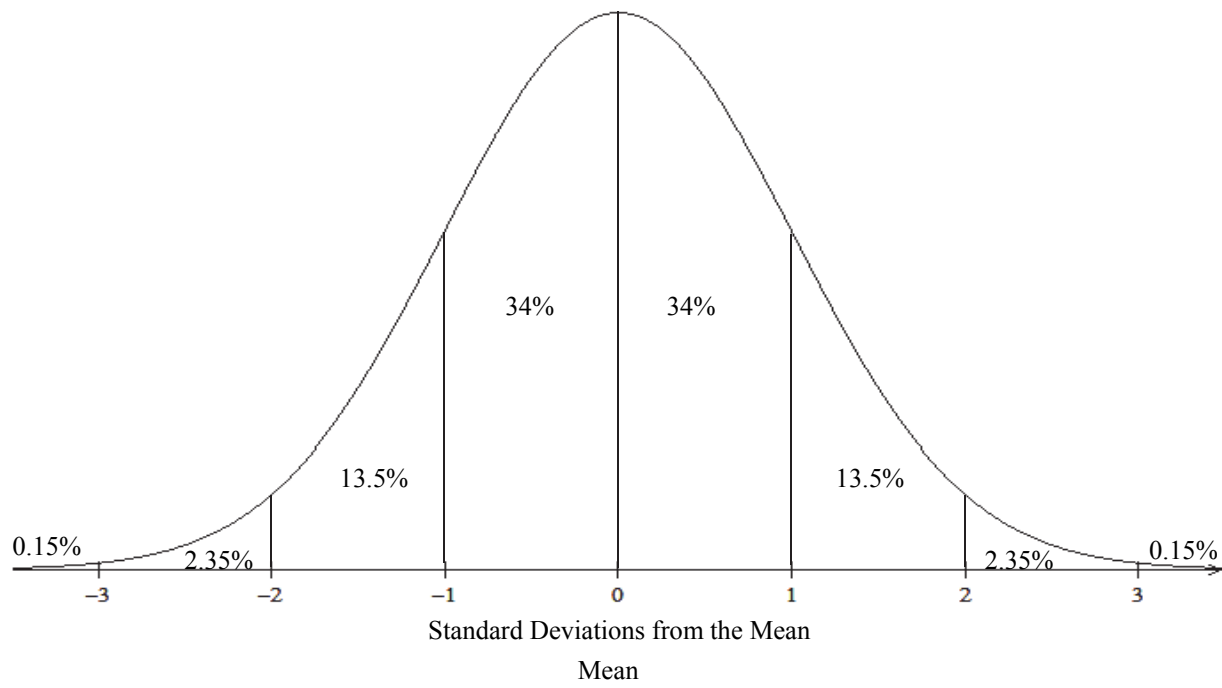
If  $A$  and  $B$  are two events, then

$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A) \cdot P(B|A)$$

The Standard Normal Distribution

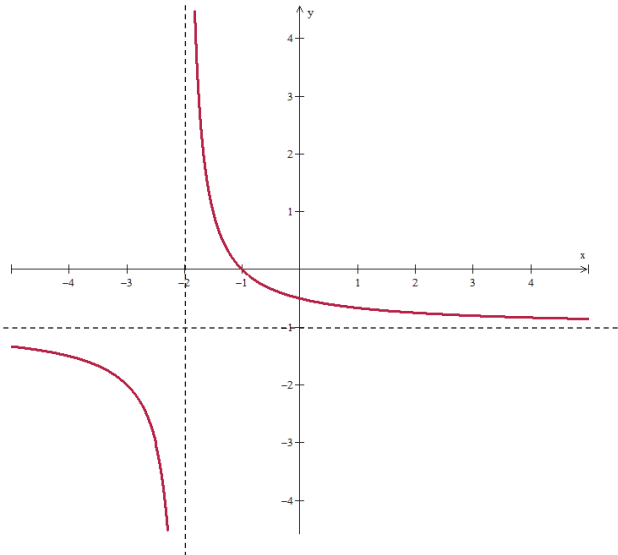


$$z\text{-score} = \frac{\text{data score} - \text{mean}}{\text{standard deviation}}$$

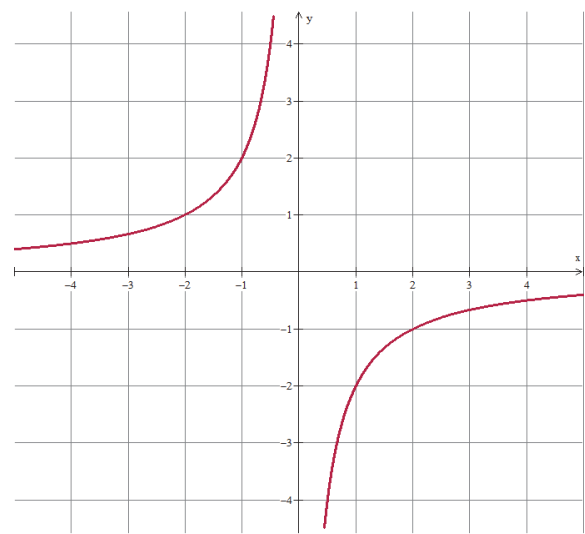
Unit 2, Topic 3

1. The graphs below are transformations of  $y = \frac{1}{x}$ . Write the equation for each graph.

a.



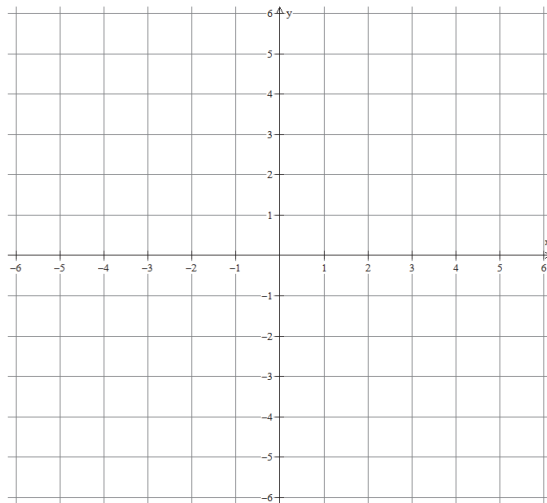
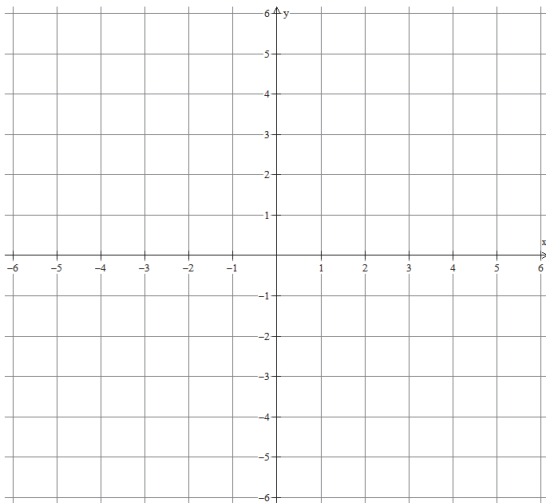
b.



2. Graph the following.

a.  $y = 3 + \frac{1}{x-1}$

b.  $y = -2 + \frac{1}{x-3}$

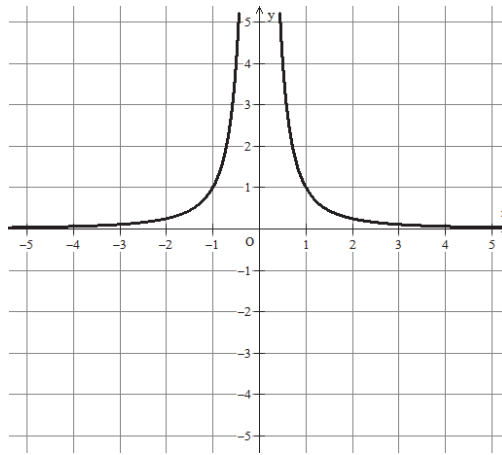
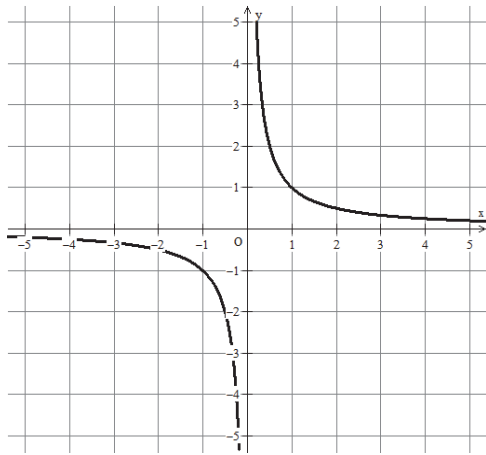


3. Write the least common multiple of the denominators in each equation, then solve the equations. Check for extraneous solutions.

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

b.  $\frac{3x+6}{(x+2)(x-2)} = \frac{x+1}{x-2}$

4. Look at the graphs of  $f(x) = \frac{1}{x}$  and  $g(x) = \frac{1}{x^2}$ .



Complete the table below for each function.

	Function $f(x) = \frac{1}{x}$	Function $g(x) = \frac{1}{x^2}$
Even, odd, or neither		
Domain		
Range		
End behavior as $x \rightarrow -\infty$		
End behavior as $x \rightarrow \infty$		

5. A house with a total wall surface area of 4,500 square feet is to be painted. Each painter can paint 300 square feet of surface in one hour.
- How long will it take one painter to paint the house?
  - Complete the blank. The number of hours that it takes to paint the house varies \_\_\_\_\_ as the number of painters.
  - Let  $n$  be the number of painters assigned to this job, and let  $H$  represent the total number of hours it will take for the paint job to be complete. Use your answer to part a) to write an equation relating  $H$  and  $n$ .
  - How many hours will it take if 4 painters are assigned to this job?
6. Write an equation relating the variables in this situation. The number of hours,  $H$ , to drive 200 miles varies inversely as the speed of the car,  $s$ , in miles per hour.

7. a. Show that the functions  $f$  and  $g$  below are equivalent.

$$f(x) = 2 + \frac{1}{x+3} \qquad g(x) = \frac{2x+7}{x+3}$$

- b. What are the equations of the asymptotes of the graphs?

8. a. Show that the functions  $h$  and  $z$  are equivalent.

$$h(x) = 5 - \frac{1}{x-4} \qquad z(x) = \frac{5x-21}{x-4}$$

- b. What are the equations of the asymptotes of the graphs?

9. Brianna bakes cakes. The average cost,  $C$ , in dollars, to make  $x$  pound cakes in a day is given by the formula  $C = \frac{250 + 6x}{x}$ .
- If Brianna bakes 10 pound cakes in one day, what was her average cost per pound cake made?
  - One day, Brianna's average cost to make each pound cake was \$11. Write and solve an equation to determine how many pound cakes she made that day.
10. Brandi makes fruitcakes. She always gives 2 fruit cakes a day to charity. The average cost per fruitcake sold,  $S$ , in dollars, is given by the formula  $S = \frac{500 + 8x}{x - 2}$ , where  $x$  is the number of fruitcakes made.
- One day, Brandi made 22 fruitcakes. What was the average cost per fruitcake sold?
  - On another day, the average cost per fruitcake sold was \$18.75. Write and solve an equation to determine how many fruitcakes she made.



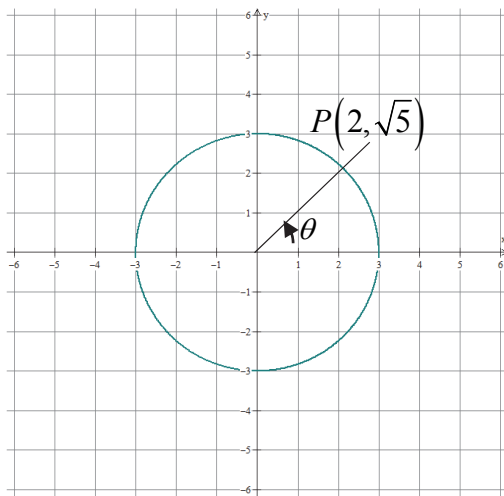
Unit 3

11. An angle  $\theta$  in standard position passes through a point  $P(x, y)$  in the coordinate plane. Complete the table below.

Values of $x$ and $y$	Quadrant of the Angle $\theta$	Sign of $\sin \theta$	Sign of $\cos \theta$
$x$ is positive, $y$ is positive			
$x$ is positive, $y$ is negative			
$x$ is negative, $y$ is positive			
$x$ is negative, $y$ is negative			

12. In each part below, a circle centered at the origin is shown, with an angle  $\theta$ . For each figure, determine  $\sin \theta$ ,  $\cos \theta$ , and  $\tan \theta$ , and the measure of the angle to the nearest tenth of a degree.

a.



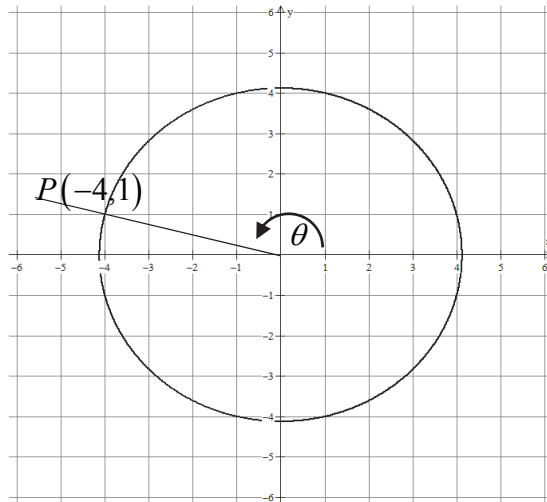
$\sin \theta =$  \_\_\_\_\_

$\cos \theta =$  \_\_\_\_\_

$\tan \theta =$  \_\_\_\_\_

$\theta =$  \_\_\_\_\_

b.



$\sin \theta =$  \_\_\_\_\_

$\cos \theta =$  \_\_\_\_\_

$\tan \theta =$  \_\_\_\_\_

$\theta =$  \_\_\_\_\_

13. An angle  $\theta$  is in quadrant 3 with  $\sin \theta = -\frac{5}{13}$ . What is the value of  $\cos \theta$ ?

14. What statement is true about the Pythagorean identity  $\sin^2 t + \cos^2 t = 1$ ?

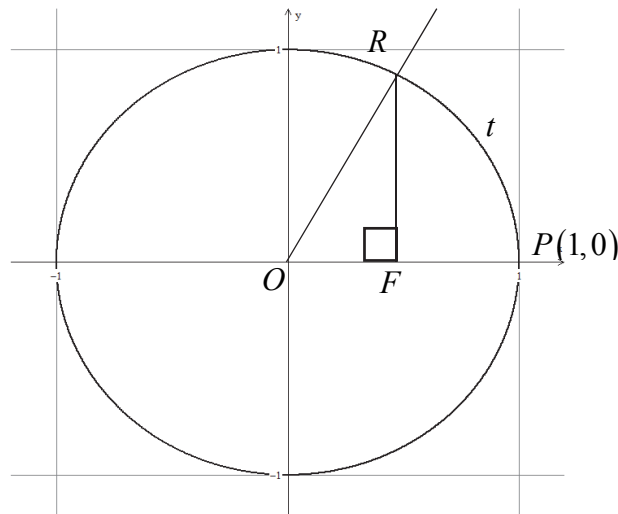
Select all that apply.

\_\_\_\_\_ Any real number can be used for  $t$ .

\_\_\_\_\_ Any degree-measured angle can be used for  $t$ .

\_\_\_\_\_ Any radian-measured angle can be used for  $t$ .

15. Look at the unit circle below. A point rotates  $80^\circ$  counter-clockwise from point  $P$  to point  $R$ .



a. What is the length, in units, of  $t$ ? You may leave your answer in terms of  $\pi$ .

b. Which segment has a length representing  $\sin t$ ? \_\_\_\_\_

c. Which segment has a length representing  $\cos t$ ? \_\_\_\_\_

d. Write the ratio of two segment lengths representing  $\tan t$ . \_\_\_\_\_

e. Name two angles whose sine value is the same as  $\sin 80^\circ$ . \_\_\_\_\_ and \_\_\_\_\_

f. Name two angles whose cosine value is the same as  $\cos t$ . \_\_\_\_\_ and \_\_\_\_\_

16. The tables below represent values from a sine or cosine function. If each were graphed, state the amplitude, period, and equation of the midline of the graph.

a.

$x$	0	1	2	3	4	5	6	7	8	9	10	11	12
$y$	50	40	30	20	10	20	30	40	50	40	30	20	10

Amplitude: \_\_\_\_\_ Period = \_\_\_\_\_ Equation of midline \_\_\_\_\_

b.

$x$	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$	$\frac{3\pi}{8}$	$\frac{\pi}{2}$	$\frac{5\pi}{8}$	$\frac{3\pi}{4}$	$\frac{7\pi}{8}$	$\pi$	$\frac{9\pi}{8}$	$\frac{5\pi}{4}$	$\frac{11\pi}{8}$	$\frac{3\pi}{2}$
$y$	18	10	2	10	18	10	2	10	18	10	2	10	18

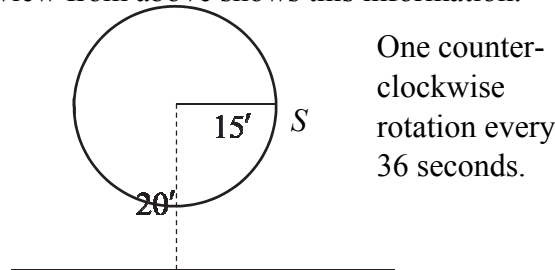
Amplitude: \_\_\_\_\_ Period = \_\_\_\_\_ Equation of midline \_\_\_\_\_

17. Let  $f(x) = \cos x$ . The four graphs described below are transformation of function  $f$ . Write the function equation for each.

- The graph of function  $g$  is the result of the graph of function  $f$  being dilated vertically by a factor of three.  $g(x) =$  \_\_\_\_\_
- The graph of function  $h$  is the result of the graph of function  $f$  being translated to the left four units and up six units.  $h(x) =$  \_\_\_\_\_
- The graph of function  $k$  is the result of the graph of function  $f$  being dilated horizontally by a factor of 7.  $k(x) =$  \_\_\_\_\_.
- The graph of function  $p$  is the graph of function  $f$  being dilated horizontally and vertically by a factor of  $\frac{1}{2}$ .  $p(x) =$  \_\_\_\_\_

At a local carnival, there is a pony ride. A person gets to ride a pony in a circle. There is a fence near the circular path. Here is some information about the pony ride.

The circular path has a radius of 15 feet. The pony travels at a constant speed and completes one counterclockwise rotation every 36 seconds. The distance from the fence to the center of the circle is 20 feet. A view from above shows this information.



Pauline’s mom wants to take some pictures and needs to know how far Pauline is from the fence at any point in time.

18. Pauline’s mother starts timing ( $t = 0$  seconds) when she is at point  $S$ , 20 feet from the fence. Determine the distance that Pauline is from the fence after she has rotated the following number of degrees counterclockwise from point  $S$ . Round your answers to the nearest tenth of a foot.

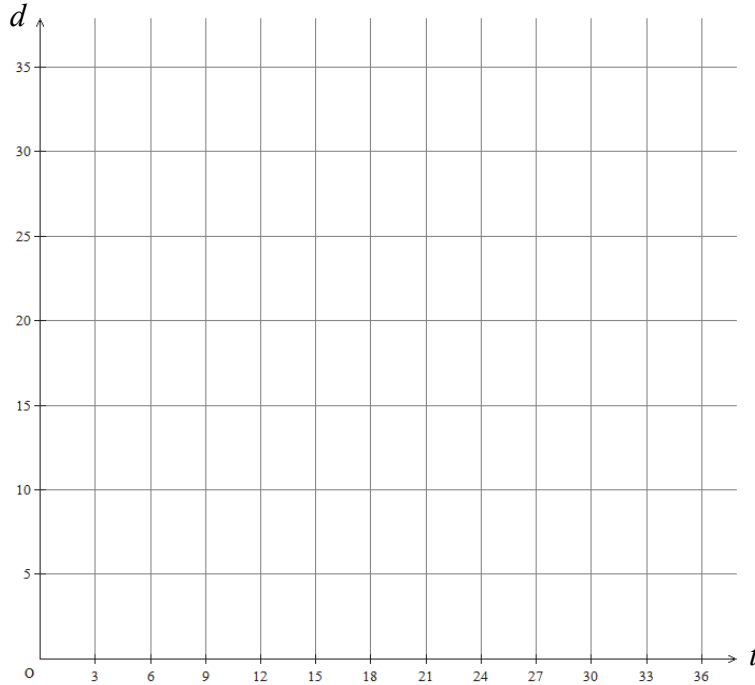
- a.  $40^\circ$  \_\_\_\_\_
- b.  $117^\circ$  \_\_\_\_\_
- c.  $230^\circ$  \_\_\_\_\_
- d. Show how you determined your answer to part a).

19. Determine how many feet Pauline is from the fence at the following times  $t$ . Round your answers to the nearest tenth of a foot.

- a. 1 second \_\_\_\_\_
- b. 24 seconds \_\_\_\_\_
- c. 31 seconds \_\_\_\_\_
- d. Show how you determined your answer to part c)

Continuation of item from previous page.

20. Sketch a graph that represents the distance Pauline is from the fence on the time interval  $[0, 36]$ .



21. What is the amplitude, period, and equation of the midline of the graph?

Amplitude: \_\_\_\_\_

Period: \_\_\_\_\_

Equation of midline: \_\_\_\_\_

22. Write an equation, for the distance that the pony is from the fence as a function of time.

## Unit 4:

23. As a science assignment, Kylie and Christine are asked to write a report on how the distance from a light source affects how a person's eyes view its intensity. They purchase a light intensity meter and a flashlight. They move the meter away from the light and measure the intensity at different distances. Here is some of their data.

Distance (meters)	Light Intensity (Lux)
1	320
2	80
3	35.6
4	20
5	10

- a. Kylie would like to present this model in the form of a table as their complete report. Is this a good idea? Explain why or why not.

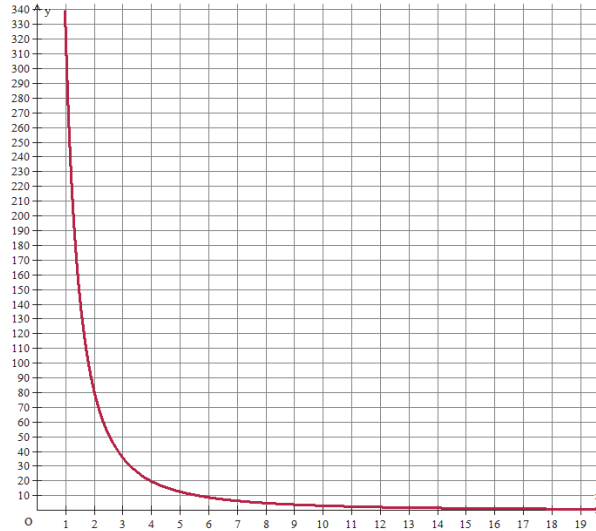
Christine does some research and finds that the intensity of light ( $I$ ) varies inversely as the square of the distance ( $d$ ) from the light source. After doing some calculations, she presents a model as the formula  $I = \frac{320}{d^2}$ .

- b. Show that Christine's formula gives the same results as Kylie's table for  $t = 2$  and  $t = 4$ .

- c. What are the allowable values for  $d$  in Christine's formula?

Continuation of item from the previous page.

Kylie thinks that a graph would be a good model. Here is her graph.



- d. Jake wants to know what distance would result in a light intensity of 1.6 lux.
- Which model (table, formula, or graph) do you think would be the best model to use in order to answer Jake? In your answer tell how you would use the model you chose, and why you did not choose the other two models.

24. Jackie is studying the following sequence of numbers.

1, 5, 14, 30

She believes that she has found two possible models for this sequence.

Recursive model:  $f(1) = 1$   
 $f(n) = f(n-1) + n^2$

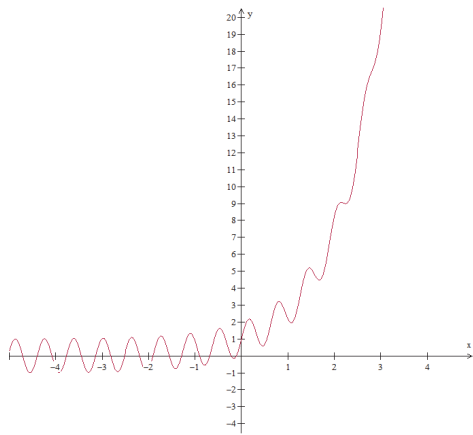
Explicit model:  $f(n) = \frac{n(n+1)(2n+1)}{6}$

Part of the modeling process involves doing computations to determine whether or not a model accurately reproduces the situation. Determine if each of Jackie's models are appropriate.

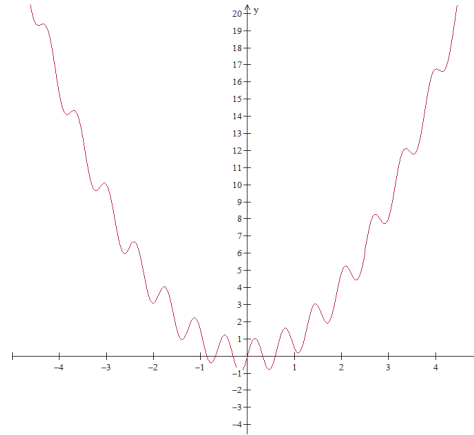


25. Name the two different function types that are added to produce each graph below.

a.



b.



26. James wants to model the following data.

$x$	0	1	2	3	4	5	6	7	8
$y$	0	40	80	40	0	40	80	40	0

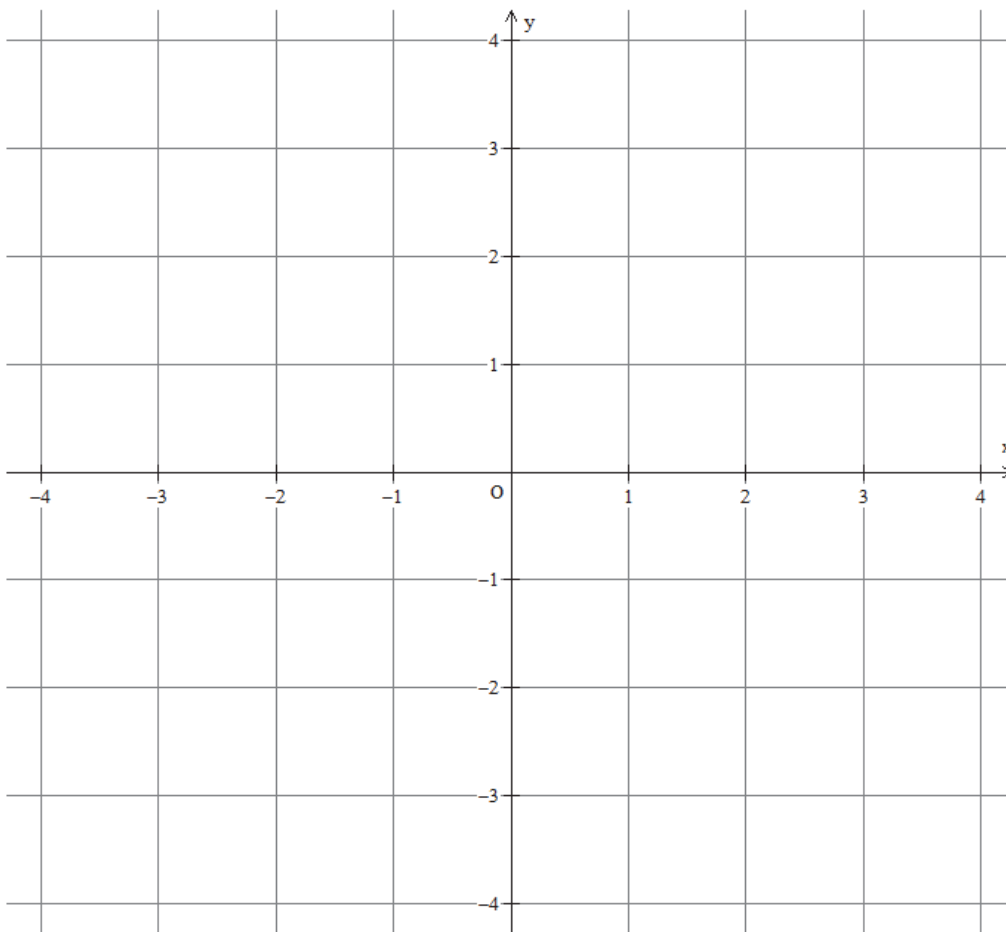
- a. Which type of function would best model this data? Give a reason for your answer.
  
- b. Robert states that the equation  $y = 40 - 40\sin(90^\circ x)$  is a good model for this data. Is Robert correct? If so, explain why. If not, modify his model to make it correct.

27. Yolanda makes a sketch in the coordinate plane made up of straight line segments. The tables below show the  $x$ - and  $y$ -coordinates of the position of her pencil as a function of time.

$t$	$x$
0	-4
1	-3
2	-1
3	0
4	3
5	4

$t$	$y$
0	3
1	3
2	0
3	-1
4	2
5	-2

Sketch Yolanda's graph of on the coordinate grid below.



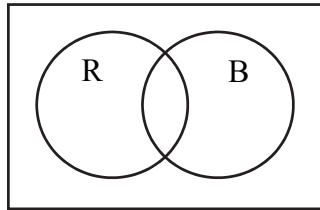
Unit 5

28. A person flips a two-sided coin (heads or tails) and rolls a six-sided number cube (numbers 1, 2, 3, 4, 5, 6). How many different outcomes are there?

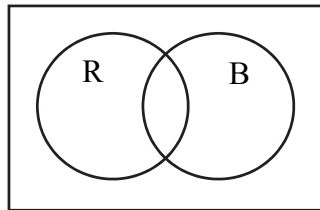
29. In the Venn Diagrams below, the events shown are  
*R: A person who likes to run* and *B: A person who likes to bike.*

In each situation below, shade in the appropriate areas.

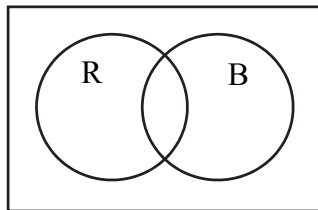
a. People who like to ride and like to bike.



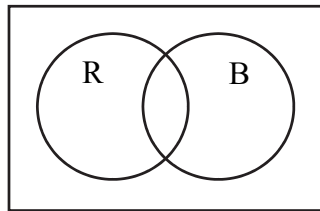
b. People who like to ride or like to bike.



c. People who do not like to ride.



d. People who like to ride, but do not like to bike.



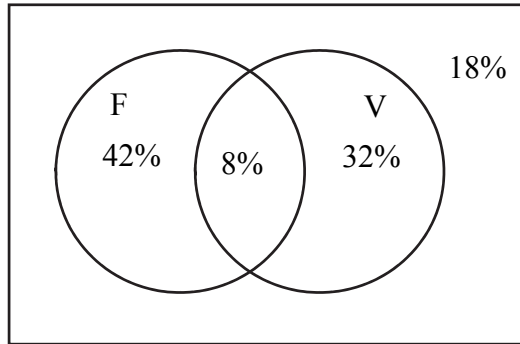
30. One-hundred people (male and female) were asked which of two sports they preferred (hockey or basketball). The results are shown in the two-way table below.

	Hockey (H)	Basketball (B)	Total
Male (M)	14	56	70
Female (F)	6	24	30
Total	20	80	100

One person is selected at random from this group. Determine the following.

- The probability that the person likes basketball.
- The probability that the person is female.
- The probability that the person prefers hockey and is male.
- The probability that the person prefers basketball and is female.
- The probability that the person is female or prefers hockey.
- The probability that the person is male or prefers basketball.
- Given that the person selected is male, the probability that the person prefers hockey.
- Given that the person selected prefers basketball, the probability that the person is female.
- Are “person is a male” and “person prefers hockey” independent events? Use what you know about conditional probabilities to justify your answer.

31. The Venn Diagram below shows the percentages of people who eat fruits (F) and vegetables (V) at least once a day.

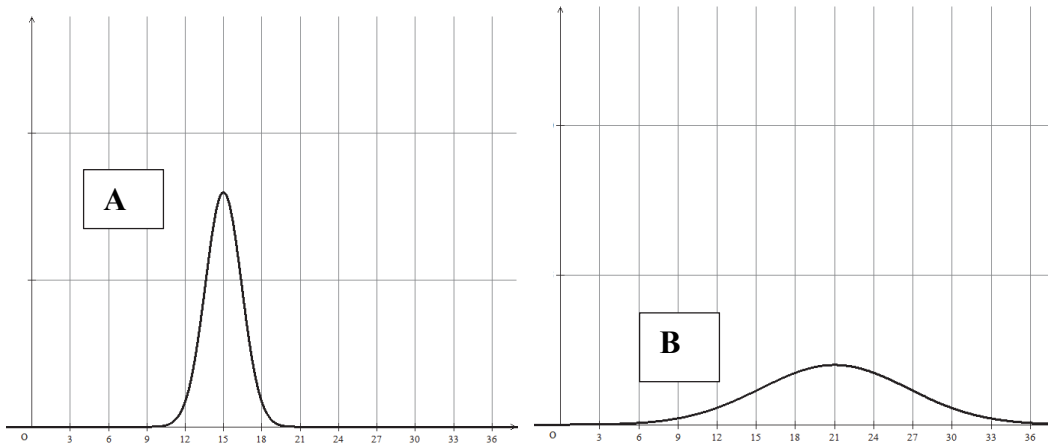


- A person is selected at random. Determine the following.
- The probability that the person eats fruits.
  - The probability that the person does not eat vegetables.
  - The probability that the person eats fruits and vegetables.
  - The probability that the person eats fruits or vegetables.
  - The probability, given that the person eats fruits, also eats vegetables.
  - The probability, given that the person eats vegetables, also eats fruits.
  - The probability, the person does not eat vegetables and also does not eat fruits.
32. The probability that Jay gets to work overtime on any given day is 40%. What is the probability that Jay will have to work overtime on three consecutive days?
33. Polly is interested in the upcoming two games played by her team. She decides that her team has a 0.7 probability of winning game one, and a 0.6 probability of winning game two. Assuming that the results of the games are independent, what is the probability of her team winning both games?
34. A machine that randomly gives out jelly beans has 4 cherry, 2 chocolate, and 5 peach jelly beans in it. Bob buys 3 jelly beans. What is the probability that all three are peach?

Unit 6

35. The life span of a certain insect is normally distributed has a mean life span of 14 days and a standard deviation of 2 days.
- What percentage of the population has a life span between 12 and 16 days?
  - What percentage of the population has a life span greater than 18 days?
  - What percentage of the population has a life span between 14 and 20 days?
  - What percentage of the population has a life span less than 12 days?
  - A particular insect lived for 24 days. Did this insect live unusually long? Use what you know about standard deviation to explain your answer.

36. The graph shows normal distribution A with mean of 15 and standard deviation 1. To its right is normal distribution B.



Complete blanks below with greater than, less than, or equal to.

- The standard deviation of distribution B is \_\_\_\_\_ the standard deviation of distribution A.
- The mean of distribution B is \_\_\_\_\_ the mean of distribution A.

37. Which statement is true about normal distributions? Select all that apply.
- \_\_\_\_\_ The graph has a vertical line of symmetry at the mean.
- \_\_\_\_\_ There is one mode, which has the same value as the mean and median.
- \_\_\_\_\_ Approximately 68% of the data lie within 1 standard deviation of the mean.
- \_\_\_\_\_ A data score with a z-score of 3 is further from the mean than a data score with a z-score of  $-2$ .
38. The president of Small-Mart is awarding “Store of the Year” to one of two stores. He will give the award to the store that did the best relative to the stores in their respective cities.

Here is the information that the president has.

City	Mean Sales for ALL stores in this city	Standard deviation in sales for all stores in this city	Store with the highest sales in this city	Sales of this store
Los Angeles	\$22.6 million	\$2.2 million	Goldie’s	\$25.9 million
Milwaukee	\$15.1 million	\$1.4 million	Ahmed’s	\$17.9 million

Which store should receive the award? Justify your answer.

39. The president of Small-Mart is also going to fire the manager of the store that has performed the worst during the past year relative to the other stores in two other cities. Here is the information that the president has.

City	Mean Sales for ALL stores in this city	Standard deviation in sales for all stores in this city	Store with the highest sales in this city	Sales of this store
New York	\$52.9 million	\$6.3 million	Jose’s	\$31.7 million
Seattle	\$30.2 million	\$4.0 million	Jamal’s	\$14.4 million

Which store will have its manager fired? Justify your answer.

