Important Concepts . . .

Preview Review

Mathematics Grade 7 TEACHER KEY

W2 - Lesson 5: Circle Graphs and Calculating Probability

Important Concepts of Grade 7 Mathematics

Materials Required

Math Set
Calculator

No Textbook Required

This is a stand-alone course.

Mathematics Grade 7
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Preview/Review W2 - Lesson 5
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Publisher: Alberta Distance Learning Centre
Written by: Sandy
Reviewed by: Barb Philips

Project Coordinator: Donna Silgard
Preview/Review Publishing Coordinating Team:
Laura Renkema and Nicole McKeand

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Preview/Review Concepts for Grade Seven Mathematics

Teacher Key

W2 – Lesson 5:

Circle Graphs and Calculating Probability

Introductory Information for Teachers

Preview/Review courses are aimed mainly at students who have completed the regular course but who need to review some of the material before beginning the next grade. Other students may find Preview/Review courses useful in preparing for the new concepts they will study in their next grade.

No Preview/Review course is intended to replace the regular course because each covers only what the writers have decided are the top 15 concepts from the Program of Studies for that course.

Preview/Review materials are intended for use by teachers and students in one-subject and one-grade classrooms. This Preview/Review course contains fifteen lessons in three sections. Each section has five lessons. A short quiz is provided at the end of each section to test student knowledge of the material studied. In a classroom the course will likely be completed in three weeks.

This Preview/Review course is written to be stand-alone. There is no textbook required.

W2 – Lesson 5: Circle Graphs and Calculating Probability

Objective:

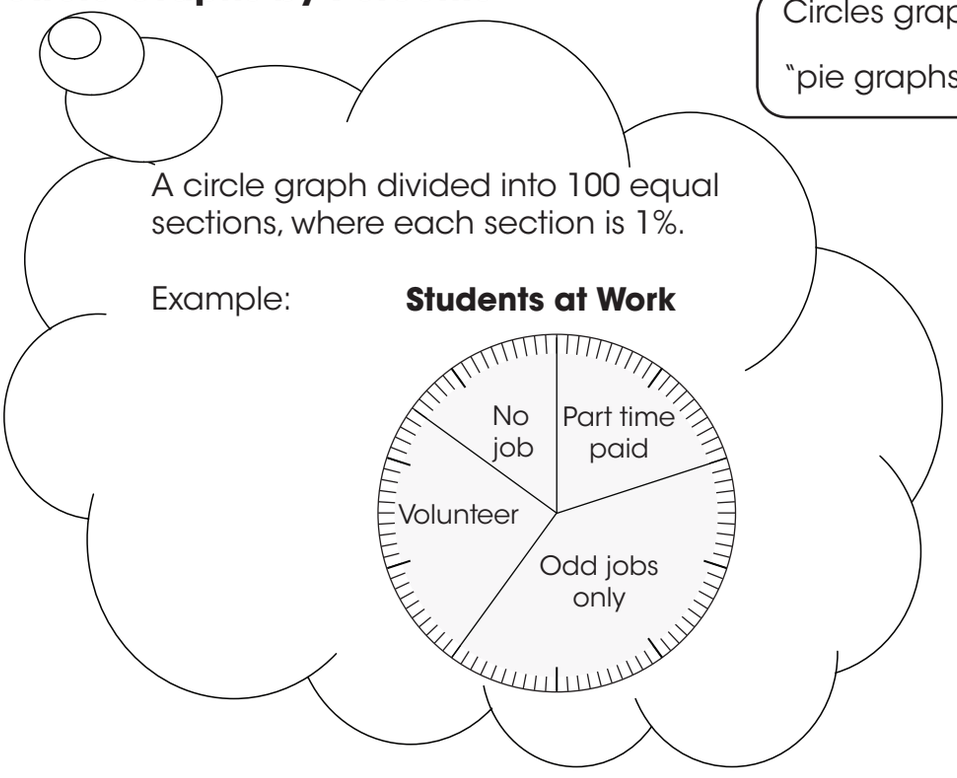
- *I can identify features of circle graphs.*

Circle Graphs by Percents

Circles graphs are also known as "pie graphs".

A circle graph divided into 100 equal sections, where each section is 1%.

Example:



Using the graph we can answer questions like:

1. What percent of students have part time paid work?

   Counting the ticks on the edge, we see 20% of students have part time paid work.

2. What type of work is done by the highest percent of students?

   The largest slice of the "pie" is students who work odd jobs only.

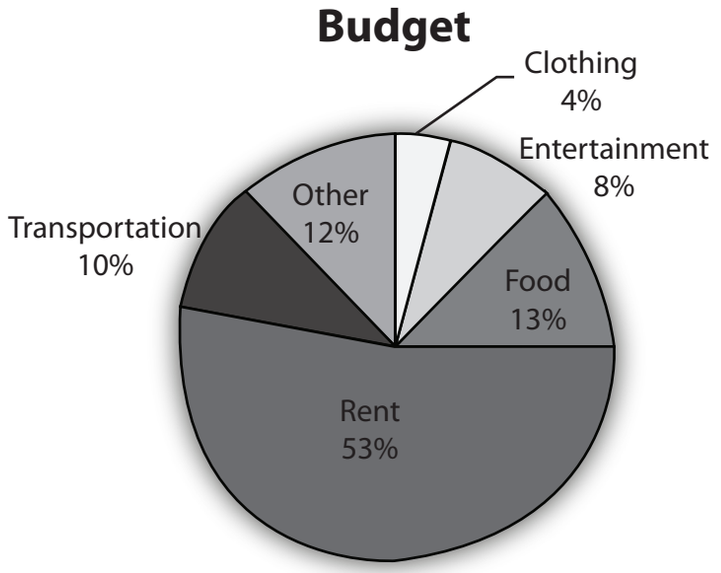
3. If 200 students were surveyed for this graph, how many students volunteer?

   The percent of students who volunteer is 25%
   25% of 200 = 0.25 × 200 = 50 students.

Practice:

A family has a budget that looks like this:

A complete circle is 360°



Read the graph to answer the questions:

a. What category does this family spend approximately half of their budgeted money on?

They spend approximately half their income on Rent.

b. What percent of their spending is on food and entertainment?

13 + 8 = 21%

c. If the family income is $3500 a month, how much money are they spending on transportation and rent each month?

3500 × 0.63 = $2205

d. The family decided they would like to start saving some of their money. If their new budget looked like this:

Clothes	4%
Entertainment	6%
Food	13%
Rent	53%
Transportation	10%
Other	10%
Savings	

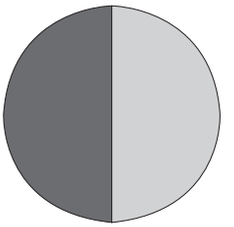
What would be the percent of the budget devoted to savings?

4 + 6+13+53+10+10 = 96
100 – 96 = 4%

Circle graphs by degrees

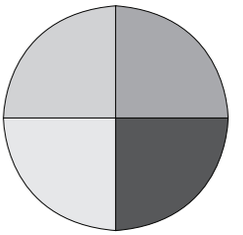
1. We can use angles to work with this type of graph.

   a. A circle is divided into 2 sections.
   $360° \div 2 =$ **180**.
   Therefore each **180** ° represents $\frac{1}{2}$.



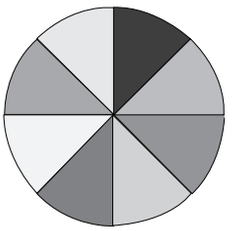
2. A circle is divided into 4 sections.

   b. $360° \div 4 =$ **90**.
   Therefore each **90** ° represents $\frac{1}{4}$.
   (Also called a right angle)



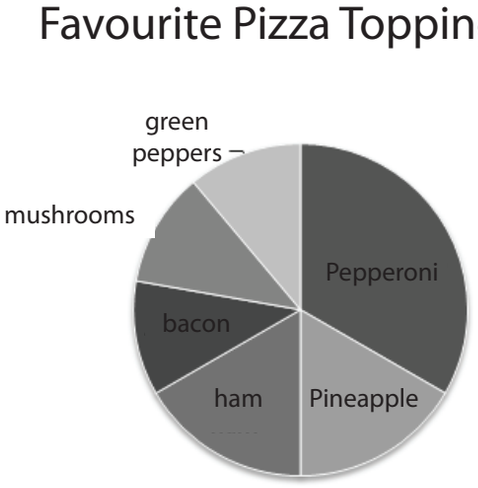
3. A circle is divided into 8 sections.

   c. $360° \div 8 =$ **45**.
   Therefore each **45** ° represents $\frac{1}{8}$.



Hint: You will find a protractor is useful when making a circle graph or reading it accurately.

Example:
Using the graph:



1. About what portion of people like pepperoni?

   The pepperoni portion represents $\frac{1}{3}$ *of the people.*

2. About what portion of people like ham?

   The ham portion is exactly half of the pepperoni portion, so $\frac{1}{6}$ *of the people like ham.*

3. If 200 people were surveyed, about how many like ham and pineapple pizzas?

   The ham and pineapple portions represents $\frac{1}{3}$ *of the people.* $\frac{1}{3} \times 200 = 67$ *people.*

Practice:

1. A small company wants to show the distribution of their employees. There are 24 employees and number of people that works in each position is listed below.

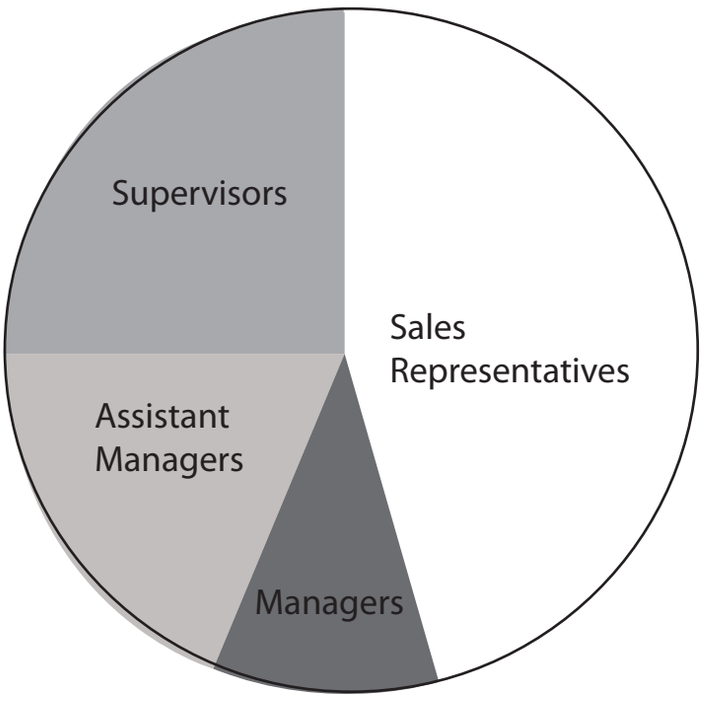
Positions	Number of People
Managers	2
Supervisors	6
Sales Representatives	11
Assistant Managers	5

a. Convert the fractions into an angle (one is completed for you).

Positions	Number of People	Fraction	Angle
Managers	2	2/24	$2/24 \times 360^\circ = 30^\circ$
Supervisors	6	6/24	$\mathbf{90^\circ}$
Sales Representatives	11	11/24	$\mathbf{165^\circ}$
Assistant Managers	5	5/24	$\mathbf{75^\circ}$

b. Using the information above, complete the circle graph below.

Company Employee Distribution



Objective:

- *I can determine the probability of an outcome.*

Probability: the likelihood of an event occurring.

It is expressed as a number between 0 and 1.

Impossible Events: have a probability of 0, they will **never** happen.

Example: The probability of pulling a green marble from a bag of red and blue marbles.

Certain Events: have a probability of 1, they will **always** happen.

Example: The probability of choosing a penny from a bag of pennies.

Calculating Probability

$$\textbf{Probability} = \frac{\textbf{(number of favourable outcomes)}}{\textbf{(total outcomes)}}$$

Example: Rolling a die has six possible outcomes.
What is the probability of rolling a 4?

$$P(4) = \frac{\text{Favorable outcomes}}{\text{total outcomes}} = \frac{1}{6}$$

We can report probability as a fraction. $\frac{1}{6}$

As a percent: 16.7%
As a decimal: 0.167

Example 2: A bag had 5 blue marbles, and 8 red marbles.
What is the probability of pulling a red marble?

$$P(\text{red}) = \frac{\text{Favorable outcomes}}{\text{total outcomes}} = \frac{8}{13}$$

Or about 62%

Practice:

1. Toss a coin, what is

   a. P(heads) = $\frac{1}{2}$

   b. P(tails) = $\frac{1}{2}$

2. Roll a die.

   a. P(3) = $\frac{1}{4}$

   b. P(2 or 6) = $\frac{2}{6} = \frac{1}{3}$

   c. P(even number) = $\frac{3}{6} = \frac{1}{2}$

   d. P(odd number) = $\frac{3}{6} = \frac{1}{2}$

3. Use the word below to answer the following questions. Hint: Look at letters and classify "y" as a vowel.

   P R O B A B I L I T Y

   a. P(B) = $\frac{2}{11}$

   b. P(I or T) = $\frac{3}{11}$

   c. P(vowel) = $\frac{5}{11}$

   d. P(consonant) = $\frac{6}{11}$

   e. P(G) = **0, Impossible event**

Law of Large Numbers

Example: Sarah bought 5 tickets for a 50/50 draw. Michael bought 10 tickets. If a total of 200 tickets were sold, what are their odds of winning?

Law of large numbers: the more times an outcome is attempted, the closer the chance of winning.

Sarah: 5/200 = about 3% Michael: 10/200 = 5%

Therefore the more tickets purchased the higher the chances of winning.

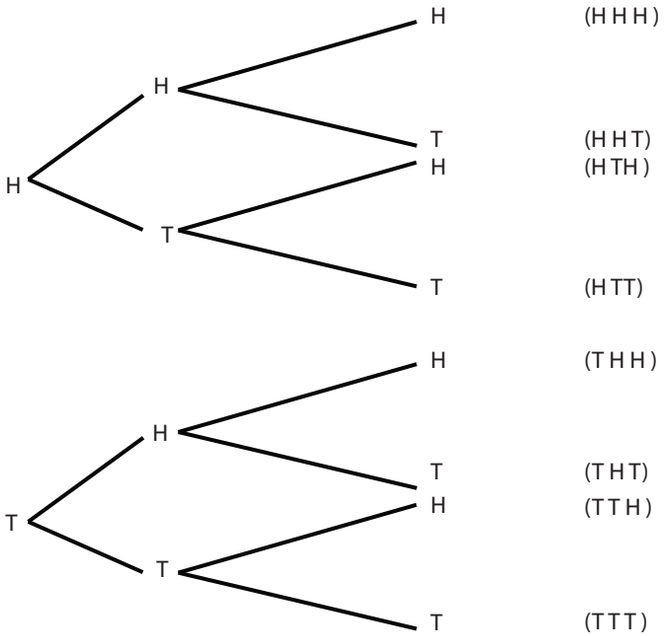
Independent Events

Events can occur one after another, like tossing coins, or they can occur simultaneously, like throwing two dice.

Independant Event: when the outcome of one event has no influence on the outcome of another.

Example: What are all the possible outcomes of flipping a coin three times?

First flip Second flip Third flip Total outcomes



1. Use the chart to answer the following questions.

   a. What is the probability of throwing all heads?

   $$\mathbf{P(H, H, H) = \frac{1}{8}}$$

   b. What is the probability of throwing all tails?

   $$\mathbf{P(T, T, T) = \frac{1}{8}}$$

   c. What is the probability of throwing two heads and one tail in any order?

   $$\mathbf{P(H, H, T) = \frac{3}{8}}$$

Calculating independent events:

P(independent events) = P(event 1) × P(event 2) × P(event 3)…

Example: A bag is filled with 8 red tokens and 12 yellow tokens. What is the probability of drawing 3 red tokens if you replace the token after each drawing?

P(3 reds) = P(1 red) × P(1 red) × P(1 red)

$$= \frac{8}{20} \times \frac{8}{20} \times \frac{8}{20} = \frac{512}{8000} = \frac{8}{125}$$ or about 6%

Example 2: A card is chosen at random from a deck of 52 cards. It is then replaced and a second card is chosen.

P(jack) = $\frac{4}{52} = \frac{1}{13}$ (lowest terms)

P(eight) = $\frac{4}{52} = \frac{1}{13}$

P(jack and eight) = P(jack) × P(eight) = $\frac{1}{13} \times \frac{1}{13} = \frac{1}{169}$

Practice:

1. A jar contains 3 red, 5 green, 2 blue and 6 yellow marbles. A marble is chosen at random from the jar. After replacing it, a second marble is chosen. What is the probability of choosing a green and a yellow marble?

   $$P(green) = \frac{5}{16}$$

   $$P(yellow) = \frac{6}{16} = \frac{3}{8}$$

   $$P(green\ and\ yellow) = \frac{5}{16} \times \frac{3}{8} = \frac{15}{128}\ or\ about\ 12\%$$

2. Spin a spinner numbered 1 to 7, and toss a coin. What is the probability of getting an odd number on the spinner and a tail on the coin?

   $$P(odd) = \frac{4}{7}$$

   $$P(tails) = \frac{1}{2}$$

   $$P(odds\ and\ tails) = \frac{4}{7} \times \frac{1}{2} = \frac{4}{14}\ or\ about\ 29\%$$

Summary and Practice:

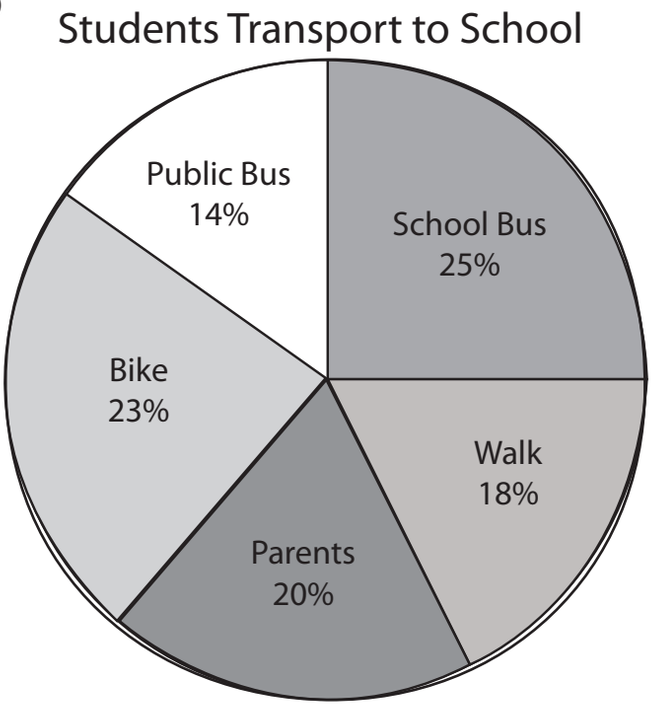
- *Using what you've learned, answer the following questions.*

1. Grade 7 students were surveyed for how they get to school every day. Their results were:

Type of Transport	Number of Students	Percent
School Bus	11	$\frac{11}{44} = 25\%$
Walk	8	$\frac{8}{44} = 18\%$
Parents Drive	9	$\frac{9}{44} = 20\%$
Bike	10	$\frac{10}{44} = 23\%$
Public Bus	6	$\frac{6}{44} = 14\%$

a. Complete the chart.

b. Using the percents calculated, complete a circle graph. (Include a title, labels, and percents)



2. True or False? Explain.

   a. If you toss a coin 5 times, it is impossible to get 5 heads.

      False, there is always a 50% chance of a heads each toss.

   b. If you toss a coin 8 times, you will always get 4 heads and 4 tails.

      False, each toss is just as likely to be a heads or tails but with so few tosses it could be more heads or more tails.

   c. If you toss a coin ten times, you might get 10 tails, but the chances are unlikely.

      True, since there is a 50% chance of getting a heads, the chances of always getting a tail are slim.

   d. The more times you toss a coin, the closer you will get to exactly 50% heads.

      True, the law of large numbers will even the odds so you'll get heads half the time.

3. A box has 4 red blocks, 3 yellow blocks, and 5 green blocks. If the blocks are replaced each time, what is:

   a. P(red) = $\frac{4}{12} = \frac{1}{3}$ **or 33%**

   b. P(green) = $\frac{5}{12}$ **or 42%**

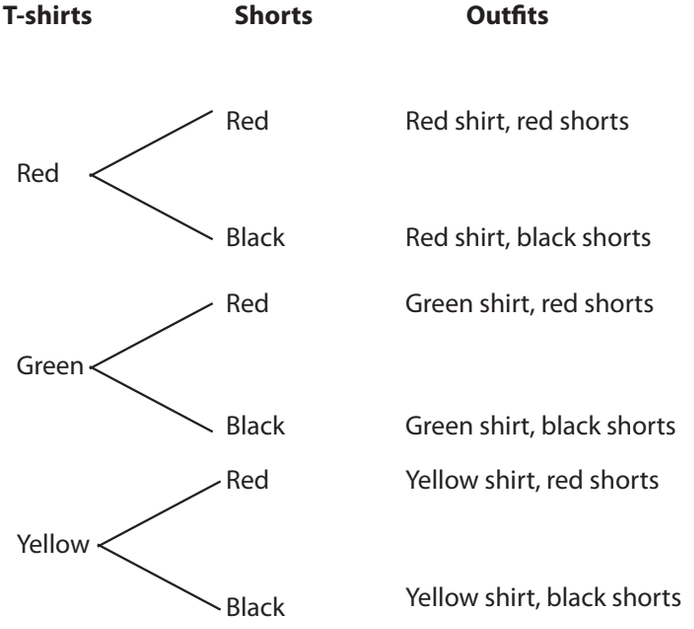
   c. P(red or yellow) = $\frac{7}{12}$ **or 58%**

   d. P(red and green) = $\frac{1}{3} \times \frac{5}{12} = \frac{5}{36}$ **or 14%**

   e. P(purple) = **0, impossible event**

   f. P(red, yellow, or green) = **100%, certain event**

4. Dylan has three T-shirts: one red, one green, and one yellow. He has two pairs of shorts: one red and one black. Use a tree diagram to show all the different outfits Dylan can make.



5. Draw a card from a deck, and toss a coin. **Remember** : A deck of (52) cards is made of 4 suits of 13 cards. What is the probability of:

   a. Drawing a spade, and tossing a head?

   $$\mathbf{P(spade) = \frac{13}{52} = \frac{1}{4}} \qquad \mathbf{P(head) = \frac{1}{2}}$$

   $$\mathbf{P(spade\ and\ heads) = \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}\ or\ about\ 13\%}$$

   b. Drawing a 7 and a tail on the coin?

   $$\mathbf{P(7) = \frac{4}{52} = \frac{1}{13}} \qquad \mathbf{P(tail) = \frac{1}{2}}$$

   $$\mathbf{P(7\ and\ tails) = \frac{1}{13} \times \frac{1}{2} = \frac{1}{26}\ or\ about\ 4\%}$$

   c. Drawing a face card (J, Q, K) and heads on the coin?

   $$\boldsymbol{P(face\ card) = \frac{12}{52} = \frac{3}{13}} \qquad \boldsymbol{P(head) = \frac{1}{2}}$$

   $$\boldsymbol{P(face\ and\ heads) = \frac{3}{13} \times \frac{1}{2} = \frac{3}{26}\ or\ about\ 12\%}$$

   d. Drawing a black card and heads on the coin?

   $$\mathbf{P(black\ card) = \frac{1}{2}} \qquad \mathbf{P(heads) = \frac{1}{2}}$$

   $$\mathbf{P(face\ and\ heads) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}\ or\ about\ 25\%}$$

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