

# Algebra Summer Work

**Due Date: Summer work will be collected at Orientation.**

Welcome to Mercy High School! I am looking forward to getting to know each of you, and to working with you in a fun year of learning. To develop as mathematicians, we need to master skills and we need to apply them to real life. This summer we are asking you to review 5 prerequisite topics of study and complete an Investigation on one of the Sisters of Mercy's Critical Concerns- the Earth.

Skills Review:

- The topics for review are: 1-Whole Numbers, Decimals, Fractions; 2-Rates, Ratios, Percents; 3-Working with Data; 4-Geometry; 5-Integers.
- Use loose-leaf, and be sure to label your papers Topic 1, Topic 2, etc. You must complete the evens for each topic, so 64 problems in total.
- Please make sure your work has your name on it and includes our Honor Pledge: *"As a woman of Mercy, I pledge that this work is my own."*
- If you need a review or some guided examples, there is a resource link on Mercy's website. On the website we have also included an answer key- you should check your work and review topics as needed, as we will be having an assessment on these skills the first week of school.

Application/Investigation:

- For the Investigation, you will complete a table and generalize your findings to discover how being able to calculate perimeter and area can help improve decisions that impact the environment. You will be working as a city planner working to designate a rectangular portion of a large forest as a protected land for native plants and animals, and you will be investigating how to make the enclosed area as large as possible. Knowing how to analyze shapes and the space they occupy can help you do your part to make the planet a livable space for future generations. Specific directions are included on the worksheet.

**Have a great summer! Mrs. King**

## Application/Investigation

You will be creating a report for the city planning commission that indicates to them the length and the width you are proposing for the protected forest land.

- As evidence to support your proposal, you will include your answers for 1-6.
- Your report will include at least 3 tables for #1, and an additional table for #4
- As a bonus, you will conclude your report telling the city planning commission of 2 examples of when you could also use your generalizations by answering #7

### Investigation – Perimeter and area of a rectangle

While planning for new residential developments, city planners want to designate a rectangular portion of a large forest as a protected area for native plants and animals. The plan is to use 20 km of fencing to enclose the area, and city planners are investigating how to make the enclosed area as large as possible. Fill in a copy of this table and generalize what you find. Add more rows as necessary and be sure to use both whole numbers and decimal values.

Perimeter (km)	Length of rectangle (km)	Width of rectangle (km)	Area of protected region (km <sup>2</sup> )
20	1		
20	2		
20			
20			
20	5		
20			
20			
20	9.8		



- 1 Perform the same calculations with other values for the perimeter.
- 2 Which shape seems to maximize the area of the protected region?
- 3 Write down a generalization about the relationship between the area of a rectangle and its perimeter, when the perimeter remains constant.
- 4 Perform similar calculations, but this time, instead of a constant perimeter, use a constant *area* of 36 km<sup>2</sup>. Set up a table similar to the one above and calculate the perimeter of each configuration.
- 5 Describe the rectangle that has the largest perimeter.  
Describe the rectangle that has the smallest perimeter.
- 6 Write down a generalization about the relationship between the area of a rectangle and its perimeter, when the area remains constant.
- 7 Give a real-life example of when you would use these generalizations, like the scenario given at the beginning of this investigation.

**Assessment**

For use with Topic 1: Whole Numbers, Decimals, and Fractions

Find the greatest common factor and the least common multiple of the pair of numbers.

1. 26, 27

2. 4, 32

3. 31, 7

4. 44, 14

5. 60, 75

6. 18, 324

Compare the two numbers. Write the answer using  $<$ ,  $=$ , or  $>$ .

7.  $\frac{7}{9}$  and  $\frac{2}{3}$

8.  $\frac{5}{4}$  and  $1\frac{5}{20}$

9.  $\frac{7}{11}$  and  $\frac{5}{8}$

Write the numbers in order from least to greatest.

10.  $\frac{3}{2}, \frac{4}{7}, \frac{3}{4}, \frac{1}{7}$

11. 0.054, 0.053, 0.0035, 0.0053

12. 2.61, 2.4, 2.345

Find each sum.

13.  $35 + 94$

14.  $46.3 + 52.689$

15.  $\frac{5}{6} + 2\frac{1}{6}$

16.  $\frac{7}{18} + \frac{2}{3}$

17.  $3\frac{5}{9} + 8\frac{1}{2}$

18.  $\frac{31}{40} + 2\frac{7}{8}$

Find each difference.

19.  $75 - 29$

20.  $115.98 - 57.09$

21.  $\frac{4}{5} - \frac{2}{5}$

22.  $3\frac{17}{21} - 1\frac{29}{42}$

23.  $8\frac{2}{3} - 4\frac{5}{6}$

24.  $\frac{11}{12} - \frac{9}{16}$

Find each product.

25.  $387 \times 25$

26.  $84.26 \times 3$

27.  $1\frac{3}{4} \times 2\frac{1}{2}$

28.  $187.36 \times 10.4$

29.  $\frac{4}{11} \times \frac{5}{13}$

30.  $0.33 \times 59.99$

Find each quotient. Round decimal quotients to the nearest hundredth if necessary.

31.  $189 \div 5$

32.  $68.22 \div 0.2$

33.  $\frac{7}{16} \div \frac{1}{4}$

34.  $38 \div 1.9$

35.  $5 \div 2\frac{2}{5}$

36.  $29.39 \div 12.5$

37. To find the approximate number of pounds, multiply the number of kilograms by 2.2. What is the approximate weight in pounds of a dog that weighs 15.42 kilograms?

38. You run  $5\frac{1}{2}$  times around a quarter-mile track. How far did you run?

**Assessment**

For use with Topic 2: Rates, Ratios, and Percents

Write each fraction or mixed number as a decimal and as a percent. If necessary, round to the nearest tenth of a percent.

1.  $3\frac{3}{5}$

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

3.  $\frac{5}{18}$

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

4. 0.36

5. 0.175

6. 7.4

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

7. 96%

8. 110%

9. 6%

Students were asked to choose which they prefer, orange juice or grapefruit juice. The results are shown in the table below.

Group	Prefer orange juice	Prefer grapefruit juice
Girls	50	18
Boys	48	10

Write each ratio in simplest form.

10. girls preferring orange juice to boys preferring orange juice

11. boys preferring orange juice to boys preferring grapefruit juice

Write each ratio as a fraction in simplest form.

12. 3 minutes to 25 seconds

13. 2 weeks : 6 days

14. 5 hours to 20 minutes

Find the unit rate.

15. 192 points in 8 games

16. 330 miles on 12 gallons

17. \$13 for 4 pounds

18. 141 pages in 3 chapters

Find the missing number.

19.  $\frac{4}{7} = \frac{?}{28}$

20.  $\frac{18}{36} = \frac{?}{6}$

21.  $\frac{6}{8} = \frac{3}{?}$

22.  $\frac{16}{?} = \frac{32}{18}$

Find the percent of the number.

23. 2% of 20

24. 35% of 70

25. 300% of 64

Find the percent. If necessary, round to the nearest tenth of a percent.

26. 11 out of 20

27. 29 out of 40

28. 1 out of 11

# Assessment

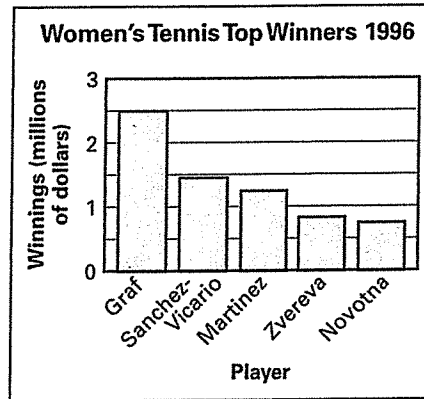
For use with Topic 3: Working with Data

Find the mean, the median, the mode(s), and the range of each data set.

- Runs scored in six games of the World Series:  
13, 4, 7, 14, 1, 5
- Homeroom attendance for one week:  
30, 28, 32, 31, 30

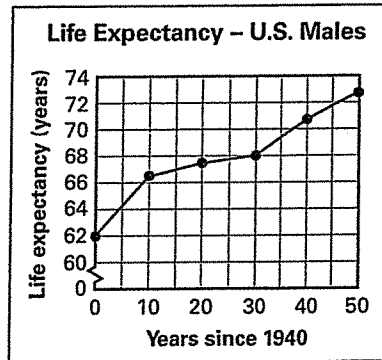
Use the bar graph at the right.

- Estimate the amount of money Graf won in 1996.
- Which player's winnings were equal to about half of Graf's?
- How many women tennis players won more than \$1 million in 1996?



For Exercises 6 and 7, use the line graph at the right.

- Estimate the life expectancy for a male born in the United States in 1980.
- Over what ten-year period shown in the graph did the life expectancy for males born in the United States increase the most?

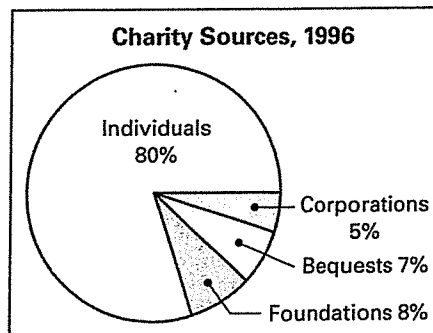


- Determine whether the data in the table below should be displayed in a bar graph or a line graph. Then graph the data.

**Pull-ups Required for Physical Fitness Award (Boys)**

Age	12	13	14	15	16	17
Number of pull-ups	7	7	10	11	11	13

- Use the circle graph at the right. Suppose charitable donations in 1996 totaled \$150 billion. How much of that was donated by corporations?
- Explain why you can compare the data in Exercises 3–5 above by comparing the lengths of the bars.
- Explain how you could alter the scale on the graph for Exercises 3–5 to make Graf's winnings appear even more impressive.



Topic 3

# Assessment

For use with Topic 4: Geometry

The first four figures in a pattern of triangles are shown below. The length of each side of each small triangle is 1 unit.

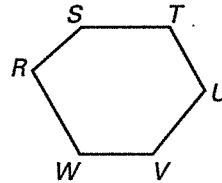


1. Find the perimeter of each figure in the pattern.
2. Write a variable expression for the perimeter of the  $n$ th figure.
3. Use your answer for Exercise 2 to find the perimeter of the 20th figure.

Sketch each figure.

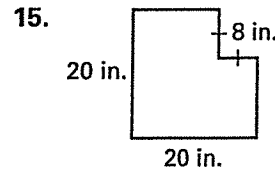
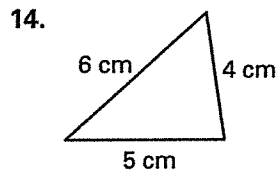
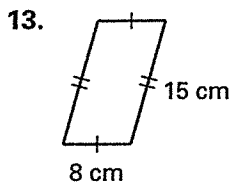
4. a rectangle whose length is twice its width
5. a parallelogram with four congruent sides
6. a pentagon that is not regular
7. a closed figure that is not a polygon

Tell whether each statement about the polygon shown at the right is *True* or *False*.

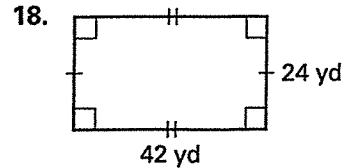
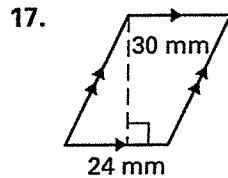
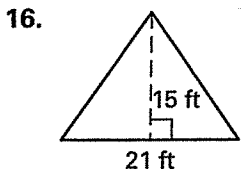


8. One correct name for the polygon is hexagon  $STUVRW$ .
9. The polygon has six vertices.
10.  $\overline{RW}$  is a diagonal of the polygon.
11. The polygon is not regular.
12. The polygon has exactly three diagonals.

Find the perimeter of each polygon.



Find the area of each polygon.



(continued)

**TOPIC**  
**4**  
**CONTINUED**

NAME \_\_\_\_\_ DATE \_\_\_\_\_

## Assessment

For use with Topic 4: Geometry

Find the circumference of the circle with the given radius or diameter. Use 3.14 or  $\frac{22}{7}$  for  $\pi$ .

19.  $r = 50$  cm

20.  $d = 22$  in.

21.  $r = 3\frac{1}{2}$  yd

Find the area of the circle with the given radius or diameter. Use 3.14 or  $\frac{22}{7}$  for  $\pi$ .

22.  $r = 17$  ft

23.  $d = 40$  m

24.  $d = 140$  mm

Topic 5

**TOPIC**  
**5**

NAME \_\_\_\_\_ DATE \_\_\_\_\_

## Assessment

For use with Topic 5: Integers

Name the opposite of the number.

1. -118

2. 0

3. 4

Find the absolute value.

4.  $|-20|$

5.  $|85|$

6.  $|0|$

Order the integers from least to greatest.

7. 9, -4, 0, -9, 3

8. 19, -22, 13, -16

9. 25, -12, -30, 35

Find each sum.

10.  $12 + 27$

11.  $-15 + 41$

12.  $-16 + (-14)$

13.  $8 + (-26)$

14.  $-30 + 30$

15.  $-24 + (-3)$

Find each difference.

16.  $13 - (-5)$

17.  $-17 - 21$

18.  $82 - 65$

19.  $20 - (-3)$

20.  $50 - 61$

21.  $-9 - 3$

Find each product.

22.  $15(80)$

23.  $(-11)(-7)$

24.  $12(-9)$

25.  $(-30)(7)$

26.  $(-9)(-41)$

27.  $10(-19)$

Find each quotient.

28.  $57 \div (-3)$

29.  $-21 \div 3$

30.  $65 \div 13$

31.  $-84 \div (-6)$

32.  $-19 \div (-1)$

33.  $54 \div (-18)$

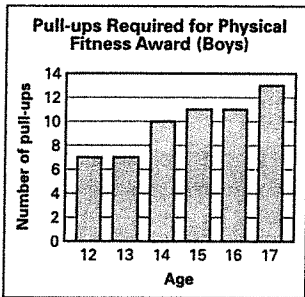
34. The lowest elevation in Death Valley National Park in California is -282 ft (282 ft below sea level). The elevation of the Park Headquarters is -190 ft. Find the difference in elevation between the two locations.

**Topic 1 Assessment** page 25

1. 1; 702   2. 4; 32   3. 1; 217   4. 2; 308
5. 15; 300   6. 18; 324   7. >   8. =   9. >
10.  $\frac{1}{7}, \frac{4}{7}, \frac{3}{4}, \frac{3}{2}$    11. 0.0035, 0.0053, 0.053, 0.054
12. 2.345, 2.4, 2.61   13. 129   14. 98.989
15. 3   16.  $1\frac{1}{18}$    17.  $12\frac{1}{18}$    18.  $3\frac{13}{20}$    19. 46
20. 58.89   21.  $\frac{2}{5}$    22.  $2\frac{5}{42}$    23.  $3\frac{5}{6}$    24.  $\frac{17}{48}$
25. 9675   26. 252.78   27.  $4\frac{3}{8}$    28. 1948.544
29.  $\frac{20}{143}$    30. 19.7967   31. 37.8   32. 341.1
33.  $1\frac{3}{4}$    34. 20   35.  $2\frac{1}{12}$    36. 2.3512 (rounds to 2.35)
37. 33.924 lb   38.  $1\frac{3}{8}$  miles

**Topic 3 Assessment** page 67

1.  $7\frac{1}{3}$ ; 6; no mode; 13   2. 30.2; 30; 30; 4
3. about 2.5 million dollars   4. Martinez
5. 3 players
6. Answers may vary. An example is given. about 71 years   7. 1940 to 1950
8. bar graph; Graphs may vary. An example is given.



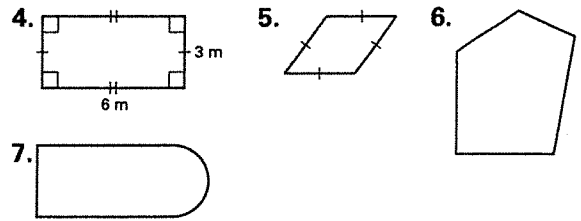
9. \$7.5 billion
10. The scale begins at 0 and continues without a break, so the lengths of the bars can actually be compared directly.
11. Answers may vary. An example is given. Start the scale at \$0.5 million, with intervals of \$0.25 million.

**Topic 2 Assessment** page 45

1. 3.6; 360%   2. 0.375; 37.5%
3.  $0.2\bar{7}$ ; 27.8%   4. 36%;  $\frac{9}{25}$    5. 17.5%;  $\frac{7}{40}$
6. 740%;  $7\frac{2}{5}$    7. 0.96;  $\frac{24}{25}$    8. 1.1;  $1\frac{1}{10}$
9. 0.06;  $\frac{3}{50}$    10.  $\frac{25}{24}$    11.  $\frac{24}{5}$    12.  $\frac{36}{5}$    13.  $\frac{7}{3}$
14.  $\frac{15}{1}$    15. 24 points/game   16. 27.5 mi/gal
17. \$3.25/lb   18. 47 pages/chapter   19. 16
20. 3   21. 4   22. 9   23. 0.4   24. 24.5
25. 192   26. 55%   27. 72.5%   28. 9.1%

**Topic 4 Assessment** pages 87-88

1. figure 1: 3 units; figure 2: 4 units; figure 3: 5 units; figure 4: 6 units
  2.  $(n + 2)$  units   3. 22 units
- For Exercises 4-6, sketches may vary. Examples are given.



8. false   9. true   10. false   11. true
  12. false   13. 46 cm   14. 15 m   15. 80 in.
  16. 157.5 ft<sup>2</sup>   17. 720 mm<sup>2</sup>   18. 1008 yd<sup>2</sup>
- In Exercises 19-24, if only one answer is given, it has been found using 3.14 for  $\pi$ .
19. about 314 cm   20. about 69.08 in.
  21. about 21.98 yd or about 22 yd
  22. about 907.46 ft<sup>2</sup>   23. about 1256 m<sup>2</sup>
  24. about 15,386 mm<sup>2</sup> or about 15,400 mm<sup>2</sup>

**Topic 5 Assessment** page 108

1. 118   2. 0   3. -4   4. 20   5. 85   6. 0
7. -9, -4, 0, 3, 9   8. -22, -16, 13, 19
9. -30, -12, 25, 35   10. 39   11. 26
12. -30   13. -18   14. 0   15. -27   16. 18
17. -38   18. 17   19. 23   20. -11   21. -12
22. 1200   23. 77   24. -108   25. -210
26. 369   27. -190   28. -19   29. -7
30. 5   31. 14   32. 19   33. -3   34. 92 ft