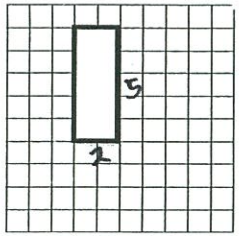
Name: Answer Key

Changing Dimensions Exploration

Calculate the area of the following figures:

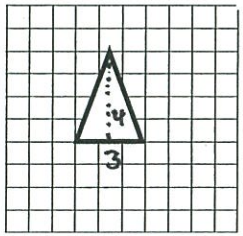
A.



$A = 2 \cdot 5 =$

$10\ cm^2$

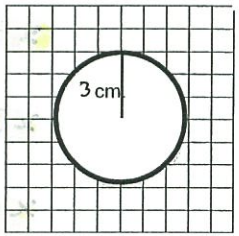
B.



$A = \frac{3 \cdot 4}{2} =$

$6\ cm^2$

C.

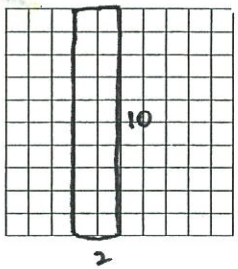


$A = \pi(3)^2$

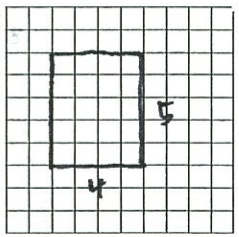
$= 28.26\ cm^2$

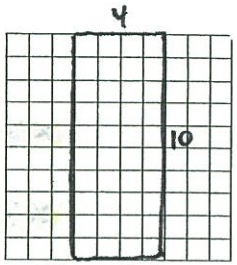
Use the three figures as the basis for the rest of the calculations. Consider the following circumstances and look for a common pattern.

1. Use the grid provided to the right to draw a new rectangle, when one dimension (height) has been doubled. In other words, the height will be 10 cm. instead of 5 cm. Label this rectangle "D".
   a. What is the area of rectangle D?
      $2 \cdot 10 = 20\ cm^2$
   b. How does the new area (D) compare to the original area (A)?
      It doubled



2. What if the height remained 5 cm. and doubled the other dimension (base)? Draw another rectangle on the grid to the right where the base would now be 4 cm. and the height would remain 5 cm. Label this rectangle "E".
   a. What is the area of rectangle E?
      $4 \cdot 5 = 20\ cm^2$
   b. How does the new area (E) compare to the original area (A)?
      It doubled





3. Use the grid provided to draw another rectangle, when both dimensions (height and base) have been doubled. The height would be 10 cm. and the base would be 4 cm. Label this rectangle "F".
   a. What is the area of rectangle F?
      $4 \cdot 10 = 40\ cm^2$
   b. How does the new area (F) compare to the original rectangle (A)?
      It quadrupled

4. Look at triangle B and consider similar scenarios to the rectangles. What would the area be if one dimension of the triangle is tripled? In other words, the base of the triangle becomes 9 cm. and the height remains 4 cm.
   a. New area:
      $A = \frac{9 \cdot 4}{2} = 18\ cm^2$
   b. How does the new area compare to the original area (B)?
      It tripled
   c. What would happen if the other dimension is tripled? The height of the triangle would be 12 cm. instead of 4 cm. and the base would remain 3 cm.
      $A = \frac{3 \cdot 12}{2} = 18\ cm^2$
   d. How does the new area compare to the original area (B)?
      It tripled

5. What would the area of the triangle be if one dimension is doubled and the other one is tripled? The base would be 9 cm. and the height would be 8 cm.
   a. New area:
      $A = \frac{9 \cdot 8}{2} = 36\ cm^2$
   b. How does the new area compare to the original area (B)?
      x 6

6. Look at circle C. What would the area be if the radius of the circle is doubled, make the radius 6 cm. instead of 3 cm?
   a. New area:
      $A = \pi(6)^2 = 113.04\ cm^2$
   b. How does the new area compare to the original circle (C)?
      It quadrupled

7. What would the area of the circle be if the radius of the circle is tripled, making the radius 9 cm. instead of 3 cm?
   a. New area:
      $A = \pi(9)^2 = 254.34\ cm^2$
   b. How does the new area compare to the original area (C)?
      x 9

Changing One Dimension (shapes other than a circle)

1. What effect does doubling one dimension have on the area of a figure?

x 2

2. What effect does tripling one dimension have on the area of a figure?

x 3

3. What do you think would happen to the area of a figure if one of its dimensions is quadrupled?

x 4

4. What do you think would happen to the area of a figure if one of its dimensions is multiplied by 5?

x 5

5. What do you think would happen to the area of a figure if one of its dimensions is multiplied by 10?

x 10

Changing Two Dimensions (shapes other than a circle)

6. What effect does doubling both dimensions have on the area of a figure?

x 4

7. What effect does tripling both dimensions have on the area of a figure?

x 9

8. What do you think would happen to the area of a figure if both dimensions are quadrupled?

x 16

9. What do you think would happen to the area of a figure if one dimension is tripled and one dimension is quadrupled?

x 12

10. What do you think would happen to the area of a figure if one dimension is multiplied by 5 and the other dimension is multiplied by 7?

x 35

Write a general rule to describe how the area of a polygon changes if its dimensions are changed by a scale factor(s). (the number they are multiplied by)

Changing Dimensions of a Circle

1. What do you think would happen to the area of a circle if the radius is tripled?

x 9

2. What do you think would happen to the area of a circle if the radius is multiplied by 6?

x 36

3. What do you think would happen to the area of a circle if the radius is multiplied by 13?

x 169

4. What do you think would happen to the area of a circle if the radius is multiplied by 5?

x 25

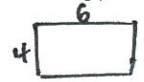
5. What do you think would happen to the area of a circle if the radius is quadrupled?

x 16

Write a general rule to describe how the area of a circle changes if its radius is changed by a scale factor.

Applications

1. If you have 20 feet of fencing and make a dog pen with an area of 24 square feet, what are the dimensions of your dog pen?



4 ft x 6 ft

2. If you doubled both of the original dimensions of the original pen, what will happen to the area?

$6 \cdot 4 = 24$
$12 \cdot 8 = 96$

x 4

3. The local pizza shop has a medium pizza for $7.95 and a large pizza for $15.95. If the medium pizza has a diameter of 8 inches and the large pizza has a diameter of 16 inches, should you buy one large or two medium pizzas for your family? Explain.

The dining room table in Jim's house measures 90.3 cm by 75.8 cm. In order to be able to sit all of his relatives, he has to add some leaves to the table. The leaves are each 30.1 cm by 75.8 cm. If he adds 3 leaves to the table, what will this do to the dimensions of the original table? What will it do to the area of the table?

Medium: $\pi(4)^2 = 50.24\ cm^2 \times 2 = 100.48\ cm^2$

Large: $\pi(8)^2 = 200.96\ cm^2$

One large, because for about the same price you get double the pizza.