Name: KEY

Hour: _____

Unit F:
Perimeter & Area

Geometry 2nd Semester

DRABBLE By Kevin Fagan

Lesson 8-1: Perimeter

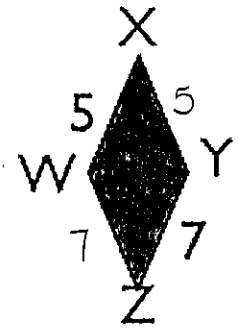
Vocabulary

Perimeter: the sum of the lengths of the sides of a polygon

Equilateral Polygon Perimeter Formula: $P = n \cdot s$, where p = perimeter, n = # of sides, & s = side length.

Practice

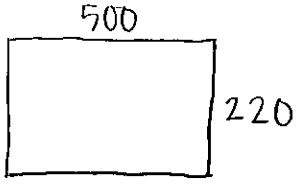
1. Kite WXYZ with ends X and Z has side lengths as shown. Find its perimeter.



$5 + 5 + 7 + 7 = 10 + 14$

$= \boxed{24 \text{ units}}$

2. A rectangular park is 500 feet long and 220 feet wide. What is the perimeter of the park?

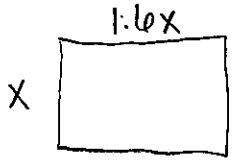


$500 + 500 + 220 + 220$

$= 1000 + 440$

$= \boxed{1440 \text{ ft}}$

3. Most rectangular flags are about 1.6 times as long as they are wide. If you have 10 meters of border material to strengthen the edges of the flag, about how large of a flag can you make?



$x + 1.6x + x + 1.6x = 10$

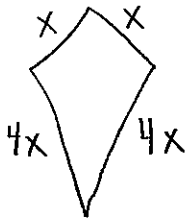
$\frac{5.2x}{5.2} = \frac{10}{5.2}$

$x = 1.92$

$\times 1.6 = 3.1$

$\boxed{3.1 \times 1.9}$

4. A flower garden is shaped like a kite and requires 50 feet of edging to surround it. If one side is 4 times as long as the other, what are the dimensions?



$x + x + 4x + 4x = 50$

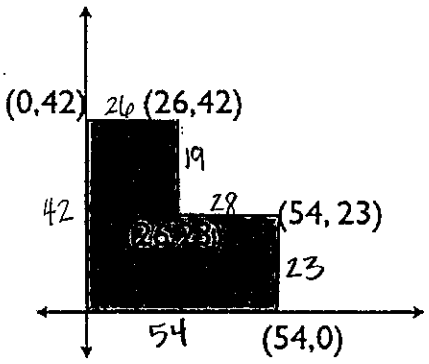
$\frac{10x}{10} = \frac{50}{10}$

$x = 5$

$\times 4 = 20$

$\boxed{5\text{ft} \text{ \& } 20\text{ft}}$

5. Find the perimeter of the given figure.



$42 + 26 + 19 + 28 + 23 + 54$

$= \boxed{192 \text{ units}}$

6. Find the perimeter of a regular hexagon with side length 4.

$P = 6 \cdot 4 = \boxed{24 \text{ units}}$

7. Find the perimeter of a regular decagon with side length h.

$P = 10 \cdot h = \boxed{10h \text{ units}}$

8. Find the perimeter of a regular nonagon with side length $7t$.

$P = 9 \cdot 7t = \boxed{63t \text{ units}}$

Lesson 8-2: Area

Vocabulary

Area: the amount of space inside a 2D figure (measured in square units - in^2 or ft^2...)

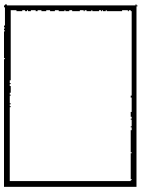
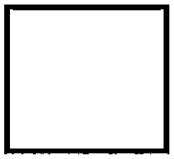
Area Postulate:

a) Uniqueness Property: every region has a unique area

b) Congruence Property: congruent figures have the same area

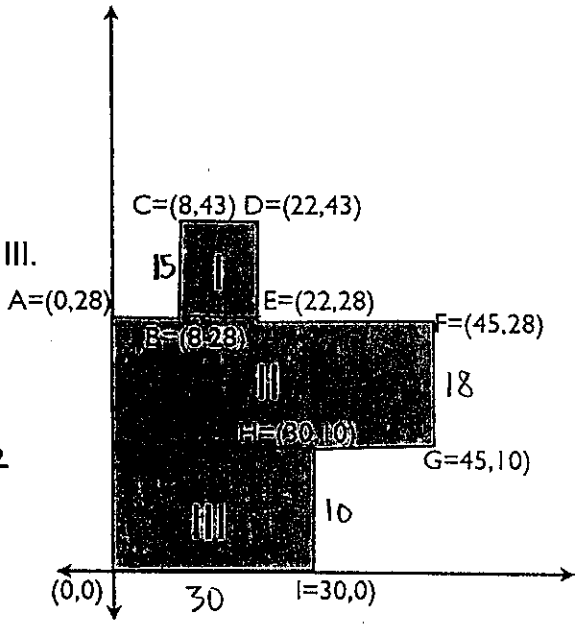
c) Additive Property: the area of 2 non-overlapping regions is the sum of their areas.

Formulas

Type	Figure	Formula	Variable Meanings
Area	**Rectangle** 	$A = l \cdot w$	l = length w = width
	Square 	$A = s^2$	s = side length

Practice

1. The floor plan of a ranch house is shown.



   a. Find the dimensions of rooms I, II, and III.

   Room I: $15 \cdot 14 = 210 \text{ units}^2$

   Room II: $18 \cdot 45 = 810 \text{ units}^2$

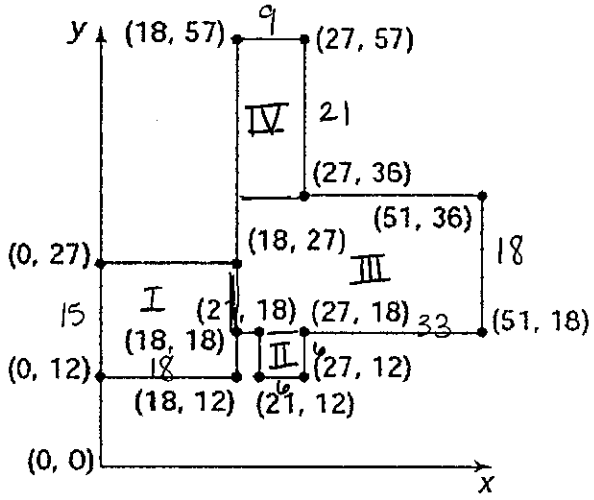
   Room III: $30 \cdot 10 = 300 \text{ units}^2$

   b. Find the floor area of the house.

$210 + 810 + 300$

$= 1{,}320 \text{ units}^2$

2. Find the area of the region at the right.



I: $15 \cdot 18 = 270$

+

II: $6 \cdot 6 = 36$

+

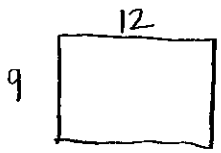
III: $33 \cdot 18 = 594$

+

IV: $9 \cdot 21 = 189$

$1{,}089 \text{ units}^2$

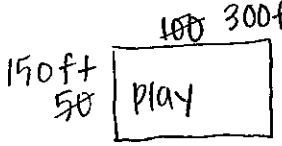
3. A carpet dealer advertises a particular carpet for $18.95 a square yard. How much will it cost to carpet a rectangular room 9 ft wide by 12 ft long? (*Notice: 3 ft = 1 yd, 9 squared feet = 1 square yard)



$9 \cdot 12 = 108 \text{ ft}^2 \left| \frac{1 \text{ yd}^2}{9 \text{ ft}^2} \right. = 12 \text{ yd}^2 \cdot \$18.95$

$= \$227.40$

4. A playground is 50 yards by 100 yards. If a roll of sod that is 72 inches long and 18 inches wide costs $1.59, about how much will it cost to sod the field?



$150 \cdot 300 = 45{,}000 \text{ ft}^2$

÷

$1.5 \cdot 6 = 9 \text{ ft}^2$

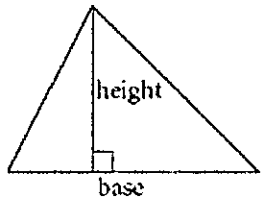
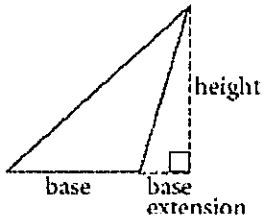
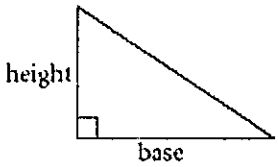
$= 5{,}000$ pieces of sod

$\times \$1.59$

$\$7{,}950$

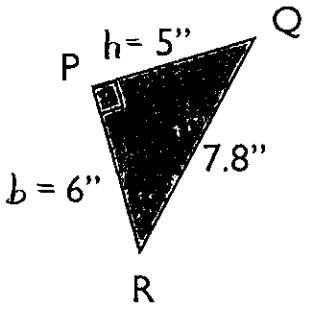
Lesson 8-4: Area of Triangles

Formulas

Type	Figure	Formula	Variable Meanings
Area	**Triangle**   	$A = \frac{1}{2} \cdot b \cdot h$	b = base h = height

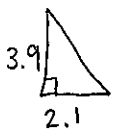
Practice

1. Find the area of the triangle.



$\frac{1}{2} \cdot 6 \cdot 5 = \boxed{15 \text{ in}^2}$

2. A right triangle has legs 2.1 meters and 3.9 meters. What is its area?



$A = \frac{1}{2} \cdot 3.9 \cdot 2.1$

$= \boxed{4.095 \text{ m}^2}$

3. Find the length of a side of a triangle with area 25 and altitude of 10.

height

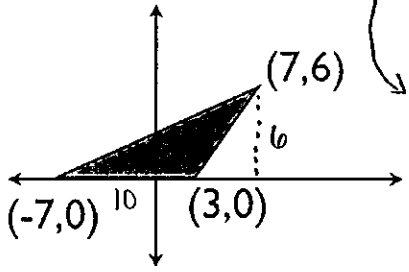
$A = \frac{1}{2} \cdot b \cdot h$

$25 = \frac{1}{2} \cdot b \cdot 10$

$\frac{25}{5} = \frac{5b}{5}$

$\boxed{5 = b}$

4. Find the area of the given triangle.

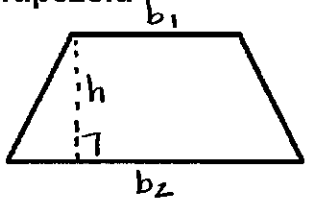
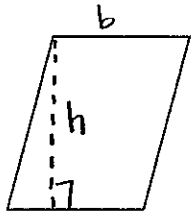


$A = \frac{1}{2} \cdot 10 \cdot 6$

$= \boxed{30 \text{ units}^2}$

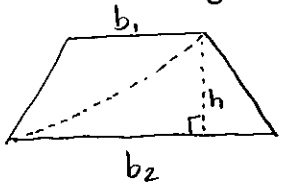
Lesson 8-5: Area of Trapezoids

Formulas

Type	Figure	Formula	Variable Meanings
Area	**Trapezoid** 	$A = \frac{1}{2}h(b_1 + b_2)$	h = height b_1 = one base b_2 = other base
	Parallelogram 	$A = b \cdot h$	b = base h = height

Practice

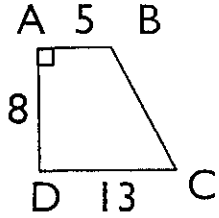
1. How do you find the formula for the area of a trapezoid from the formula for the area of a triangle?



A trapezoid is just 2 $\triangle$'s, so

$\frac{1}{2}b_1 h + \frac{1}{2}b_2 h = \frac{1}{2}h(b_1 + b_2)$

2. Find the area of trapezoid *ABCD*.

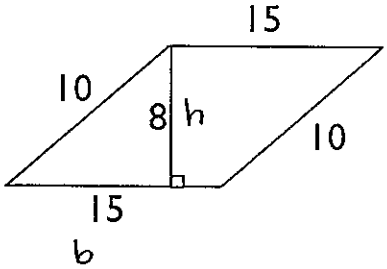


$A = \frac{1}{2} \cdot 8 \cdot (5 + 13)$

$= 4 \cdot 18$

$= \boxed{72 \text{ un}^2}$

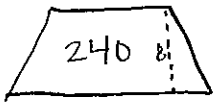
3. Find the area of the parallelogram.



$A = 15 \cdot 8$

$= \boxed{120 \text{ un}^2}$

4. An isosceles trapezoid has an area of 240 and a height of 8. Give two possible combinations of lengths for the bases of the trapezoid.



$A = \frac{1}{2}h(b_1 + b_2)$

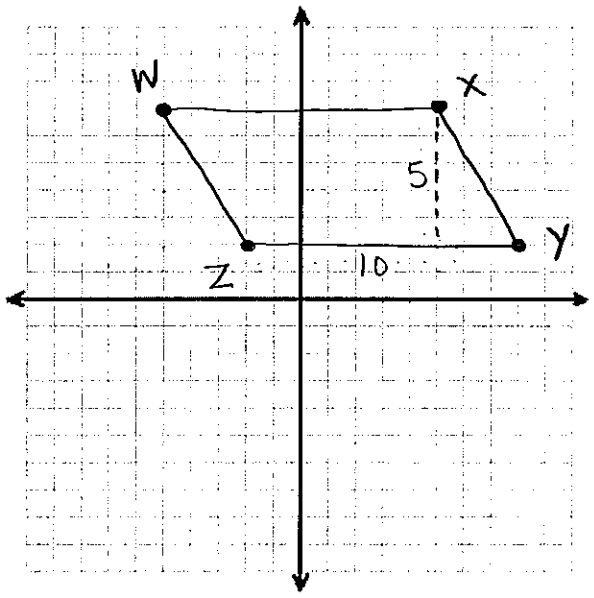
$240 = \frac{1}{2} \cdot 8 (b_1 + b_2)$

$\frac{240}{4} = \frac{4(b_1 + b_2)}{4}$

$60 = b_1 + b_2$

20 & 40 or
10 & 50

5. Parallelogram *WXYZ* has vertices *W*(-5, 7), *X*(5, 7), *Y*(8, 2), and *Z*(-2, 2). What is the area of the parallelogram?



$A = b \cdot h$

$= 10 \cdot 5$

$= 50 \text{ units}^2$

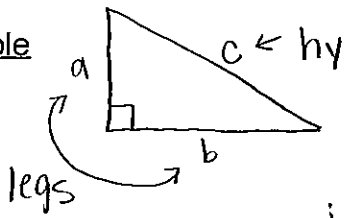
Lesson 8-6: Pythagorean Theorem

Vocabulary

only in right Δ's

Pythagorean Theorem: $a^2 + b^2 = c^2$, where a & b are LEGS & c is the HYPOTENUSE!

Example



* legs are next to 90° angle
* hypotenuse is longest side

Pythagorean Converse Theorem: if a triangle has sides a, b, & c and $a^2+b^2=c^2$, then its a right triangle.

Pythagorean Triple: a set of 3 numbers that can be the lengths of a right triangle

Proof of the Pythagorean Theorem:

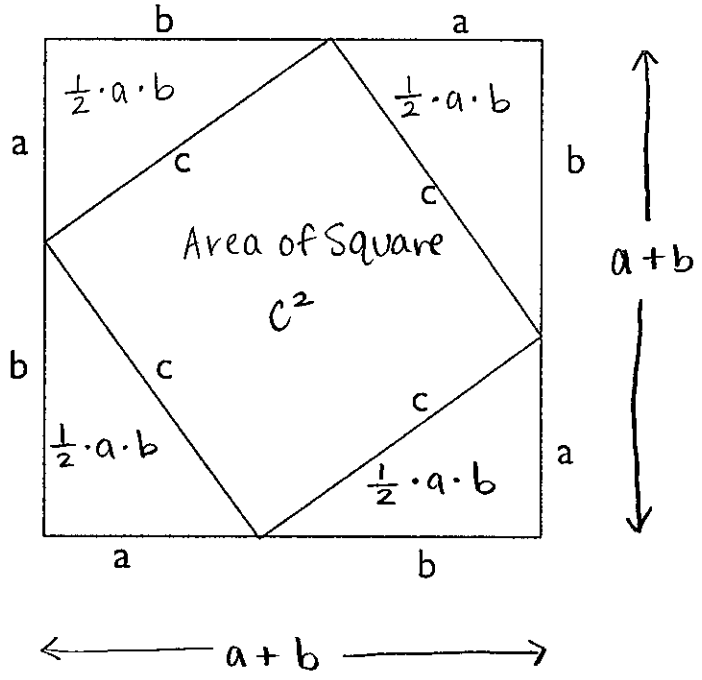
Prove: $a^2+b^2=c^2$

$(a+b)(a+b) = 4(\frac{1}{2}ab) + c^2$

$a^2 + 2ab + b^2 = 2ab + c^2$

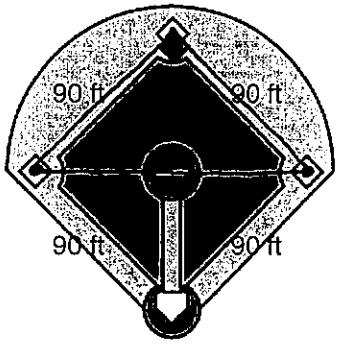
$-2ab \qquad -2ab$

$$\boxed{a^2 + b^2 = c^2}$$



Practice

1. You picked up a ground ball at first base, and you see the other team's player running towards third base. How far do you have to throw the ball to get it from first base to third base to throw out the runner?



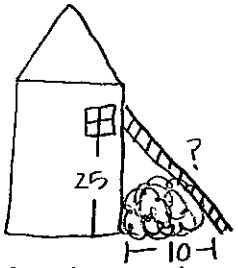
$a^2 + b^2 = c^2$

$90^2 + 90^2 = c^2$

$\sqrt{16,200} = \sqrt{c^2}$

$c \approx 127.3$ ft

2. You are locked out of your house and the only open window is on the second floor, 25 feet above the ground. You need to borrow a ladder from one of your neighbors. There's a bush along the edge of the house, so you'll have to place the ladder 10 feet from the house. What length of ladder do you need to reach the window?



$a^2 + b^2 = c^2$

$25^2 + 10^2 = c^2$

$\sqrt{725} = \sqrt{c^2}$

$c \approx 26.9$ ft

3. Are the numbers 11, 20, and 23 a Pythagorean Triple?

(a = 11, b = 20, c = 23)

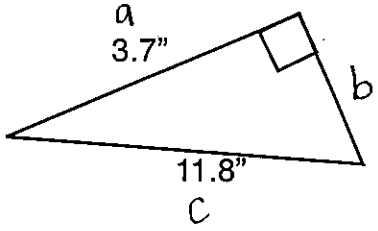
$a^2 + b^2 = c^2$

$11^2 + 20^2 = 23^2$

$521 \neq 529$

No, since $521 \neq 529$.

4. Find the length of the missing side on the right triangle, then find the area.



$a^2 + b^2 = c^2$

$3.7^2 + b^2 = 11.8^2$

$13.69 + b^2 = 139.24$

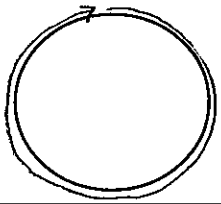
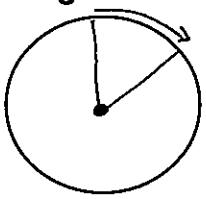
$-13.69 \quad -13.69$

$\sqrt{b^2} = \sqrt{125.55}$

$b \approx 11.2$"

Lesson 8-7: Arc Length & Circumference

Vocabulary

Type	Figure	Formula	Variable Meanings
Perimeter	**Circumference** 	$C = 2 \cdot \pi \cdot r$ (or $C = \pi \cdot d$)	r = radius d = diameter
	Arc Length 	$\text{Arc Length} = \frac{\theta}{360} \cdot C$	θ = degrees C = circumference, $2 \cdot \pi \cdot r$ or $\pi \cdot d$

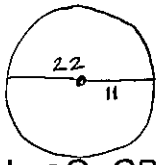
"Exact Answers": still have "π" in the answer

"Rounded Answers": a number w/out "π" & rounded

Practice

radius = 11

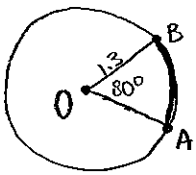
1. A bike wheel has a diameter of 22 inches. If a rider can get it to go 200 revolutions per minute, how far will the bike travel in that time? Give an exact answer and a rounded answer.



$C = 2\pi \cdot 11$

$= 69.12"$ in 1 revolution $\times 200 =$ **13,824" in 1 min.**

2. In ⊙O, $OB = 1.3$cm and $m\angle AOB = 80$. Find the length of AB.

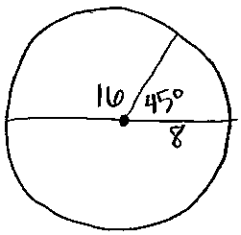


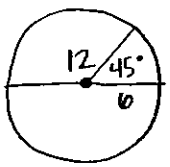
$\text{Arc Length} = \frac{80}{360} \cdot (2\pi \cdot 1.3)$ (C)

$= .\overline{2} \cdot 8.168 =$ **1.82cm**

3. An ant is crawling along the crust of a large piece of 16" diameter pizza. The piece has a central angle of 45°. How much farther does that ant crawl than another ant who is on a medium piece of 12" diameter pizza, with central angle 45°?

(Lg)





$\frac{45}{360} \cdot 2 \cdot \pi \cdot 8 = 6.28$

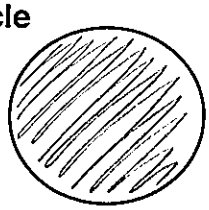
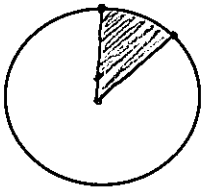
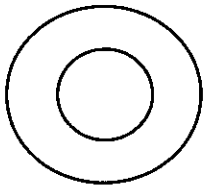
−

$\frac{45}{360} \cdot 2 \cdot \pi \cdot 6 = 4.71$

1.57"

Lesson 8-8: The Area of a Circle

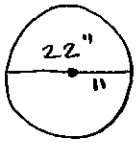
Formulas

Type	Figure	Formula	Variable Meanings
Area	**Circle** 	$A = \pi \cdot r^2$	r = radius
	Sector of Circle 	$\text{Sector Area} = \frac{\theta}{360} \cdot A$	θ = degrees A = area, $\pi \cdot r^2$
	Bullseye Probability 	$\frac{\text{area of bullseye}}{\text{area of target}}$	use $\pi \cdot r^2$

Practice

1. Find the area of a sewer cover with diameter 22".

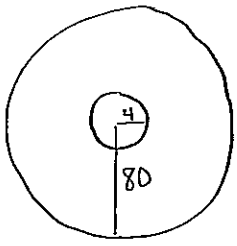
radius = 11



$A = \pi \cdot 11^2$

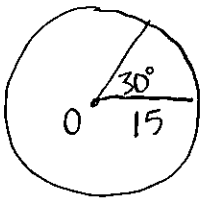
$= \boxed{380.13 \text{ in}^2}$

2. In Olympic archery, the target's bullseye has a radius of 4 cm and the radius of the outside of the target is 80 cm. What is the probably that an arrow shot hitting the target randomly hits the bullseye?



$\frac{\pi \cdot 4^2}{\pi \cdot 80^2} = \boxed{.0025 \text{ or } .25\%}$

3. In ⊙O, the radius is 15. Find the area of a sector with central angle 30°.



$\text{Sector Area} = \frac{30}{360} \cdot (\pi \cdot 15^2)$ (A) $= .08\bar{3} \cdot 706.86$

$= \boxed{58.9 \text{ units}^2}$

Lesson: Area of a Regular Polygon & Composite Figures

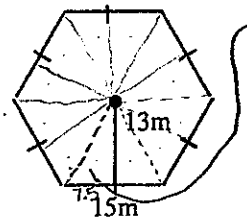
Vocabulary

Regular Polygon: a figure w/ all sides equal in length & all angles equal.

Composite Figure: a figure composed of other figures.

Practice

1. Find the area of the given figure.



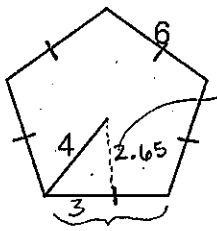
$\frac{1}{2} \cdot b \cdot h$

$= \frac{1}{2} \cdot 15 \cdot 13 = 48.75$

$\times 12$

$585 m^2$

2. Find the area of the given figure.



$a^2 + b^2 = c^2$

$3^2 + b^2 = 4^2$

$-3^2 \quad -3^2$

$\sqrt{b^2} = \sqrt{7}$

$b = 2.65$

$\frac{1}{2} \cdot b \cdot h$

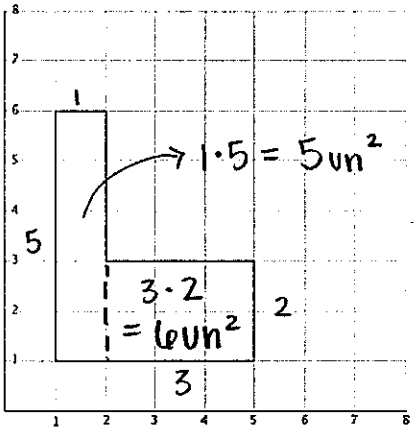
$\frac{1}{2} \cdot 3 \cdot 2.65$

$= 3.975$

$\times 10$

39.75_{un}

3. Find the area of the given figure.



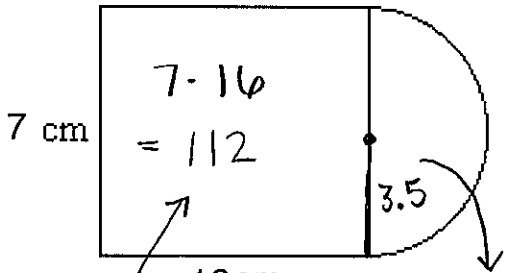
$1 \cdot 5 = 5 un^2$

$3 \cdot 2 = 6 un^2$

$5 + 6 =$

$11 un^2$

4. Find the area of the given figure.



$7 \cdot 16 = 112$

$A = \pi r^2$

$= \pi \cdot 3.5^2$

$= 38.48$

$\frac{38.48}{2}$

$= 19.24$

$112 + 19.24$

$131.24 cm^2$