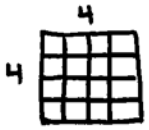
Name: KEY
Date: _____

Math 8
Unit 2 Review ~ Squares, Cubes, & The Pythagorean Theorem

☐ **S1: I can identify perfect squares, determine square roots of real perfect squares, and relate perfect squares to area.**

1. Show that 16 is a perfect square using a diagram, symbols, **and** words.



$4^2 = 16$ four squared is sixteen

2. Evaluate the following.

Basic	Intermediate	Advanced
9^2 81	21^2 441	$-17^2 = -(17^2)$ -289
$\left(\frac{2}{7}\right)^2$ $\frac{4}{49}$	$\left(\frac{12}{17}\right)^2$ $\frac{144}{289}$	$\left(\frac{-1}{14}\right)^2$ $\frac{1}{196}$
0.8^2 0.64	1.5^2 2.25	0.04^2 0.0016
$\sqrt{4}$ 2	$\sqrt{144}$ 12	$-\sqrt{400}$ -20
$\sqrt{81}$ 9	$\sqrt{256}$ 16	$\sqrt{-100}$ no solution (can't square root a neg.)
$\sqrt{\frac{36}{49}}$ $\frac{6}{7}$	$\sqrt{\frac{81}{169}}$ $\frac{9}{13}$	$\sqrt{\frac{121}{484}}$ $\frac{11}{22} = \frac{1}{2}$
$\sqrt{0.25}$ 0.5	$\sqrt{1.21}$ 1.1	$\sqrt{0.0144}$ 0.12

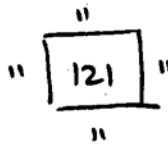
3. Find the **area** of a square with each side length.

Basic	Intermediate	Advanced
7 cm $7^2 = 49$ cm^2	12 mm $12^2 = 144$ mm^2	2.4 m $2.4^2 = 5.76$ m^2

4. Find the **side length** of a square with each area.

Basic	Intermediate	Advanced
25 m^2 $\sqrt{25} = 5$ m	169 mm^2 $\sqrt{169} = 13$ mm	1.96 cm^2 $\sqrt{1.96} = 1.4$ cm

5. The area of a square is 121 cm^2. What is the perimeter of the square?



$\sqrt{121} = 11$ cm

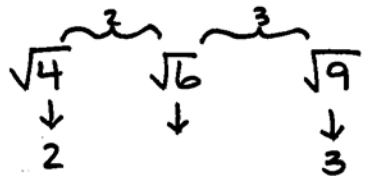
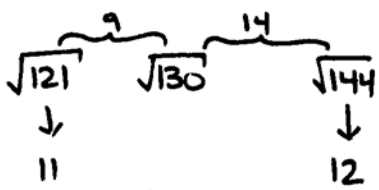
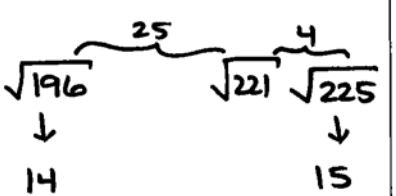
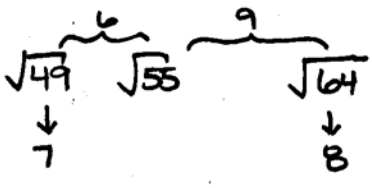
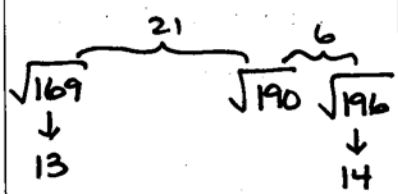
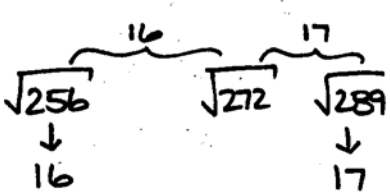
$P = 4 \times 11 = \boxed{44 \text{ cm}}$

☐ **S2: I can estimate non-perfect square roots using benchmarking.**

1. These numbers are not square numbers. Which two consecutive perfect squares is each number between?

3	47	111	180
1 , 4	36 , 49	100 , 121	169 , 196

2. Use benchmarking to estimate each square root to the nearest tenth (one decimal place).

Basic	Intermediate	Advanced
$\sqrt{6} \approx 2.4$ 	$\sqrt{130} \approx 11.4$ 	$\sqrt{221} \approx 14.9$ 
$\sqrt{55} \approx 7.4$ 	$\sqrt{190} \approx 13.8$ 	$\sqrt{272} \approx 16.5$ 

3. Which is the better estimate of $\sqrt{72}$: 8.4 or 8.5? How do you know?

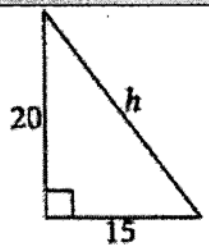
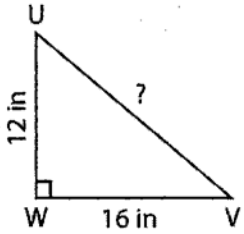
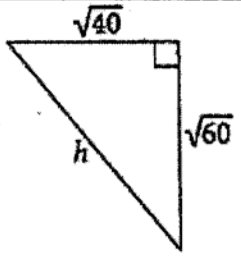
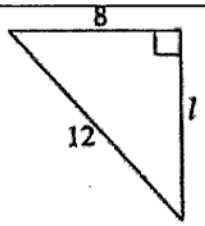
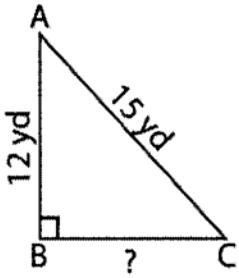
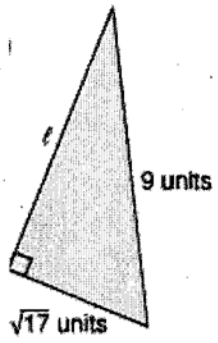
3	4
8.4	8.5
×8.4	×8.5
336	425
+6720	+6800
70.56	72.25

↑

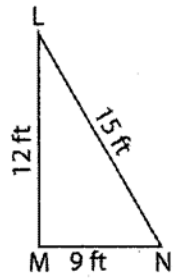
closer to 72, so $\sqrt{72} \approx \boxed{8.5}$

☐ **S3: I can apply the Pythagorean Theorem to right triangles to find a missing side.**

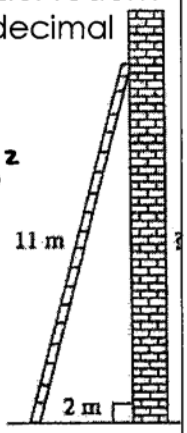
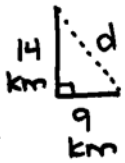
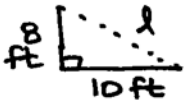
1. Find the length of the indicated side in the triangle below. Please show all work and estimate your answer to one decimal place if necessary.

Basic	Intermediate	Advanced
		
$15^2 + 20^2 = h^2$ $225 + 400 = h^2$ $\sqrt{625} = \sqrt{h^2}$ $25 = h$	$12^2 + 16^2 = c^2$ $144 + 256 = c^2$ $\sqrt{400} = \sqrt{c^2}$ $20 = c$ in	$\sqrt{40}^2 + \sqrt{60}^2 = h^2$ $40 + 60 = h^2$ $\sqrt{100} = \sqrt{h^2}$ $10 = h$
		
$12^2 - 8^2 = \ell^2$ $144 - 64 = \ell^2$ $\sqrt{80} = \sqrt{\ell^2}$ $8.9 \approx \ell$	$15^2 - 12^2 = a^2$ $225 - 144 = a^2$ $\sqrt{81} = \sqrt{a^2}$ $9 = a$ yd	$9^2 - \sqrt{17}^2 = \ell^2$ $81 - 17 = \ell^2$ $\sqrt{64} = \sqrt{\ell^2}$ $8 = \ell$ units

2. Determine whether a triangle with the given side lengths is a right triangle. Please show your work to explain your thinking.

Basic	Intermediate	Advanced
 $9^2 + 12^2 = 15^2$? $81 + 144 = 225$ $225 = 225$ ✓ Yes this is a R.A.T.	A triangle has side lengths 6 cm, 4 cm, and 10 cm $4^2 + 6^2 = 10^2$? $16 + 36 = 100$ $52 \neq 100$ No, this is not a R.A.T.	In triangle ABC, the sides AB, BC, and AC measure 24 ft, 10 ft, and 26 ft respectively. Prove that ABC is a right triangle. $10^2 + 24^2 = 26^2$ $100 + 576 = 676$ $676 = 676$ ✓ Therefore this is a R.A.T.

3. Solve the given problem involving a right triangle. Please show all work and answer with a complete sentence.

Basic	Intermediate	Advanced
How high up the wall does the ladder reach? Answer to 1 decimal place.  $11^2 - 2^2 = h^2$ $121 - 4 = h^2$ $\sqrt{117} = \sqrt{h^2}$ $10.8 \approx h$ m The ladder reaches approx. 10.8 m up the wall.	A ship travels for 14 km toward the south. It then changes direction and travels for 9 km toward the east. How far does the ship have to travel to return directly to its starting point? Answer to one decimal place.  $9^2 + 14^2 = d^2$ $81 + 196 = d^2$ $\sqrt{277} = \sqrt{d^2}$ $16.6 \approx d$ km The ship must travel approx. 16.6 km.	A tree is axed 8 feet above its base. When the tree fell to the ground, the tip of the tree lay 10 feet away from its base. Determine the length of the part of the tree that was axed.  $8^2 + 10^2 = l^2$ $64 + 100 = l^2$ $\sqrt{164} = \sqrt{l^2}$ $12.8 \approx l$ feet Approx 12.8 ft were axed off the tree.

☐ **S4: I can identify perfect cubes, determine cube roots of real perfect cubes, and relate perfect cubes to volume.**

1. Evaluate the following.

Basic	Intermediate	Advanced
5^3 125	11^3 1331	$(-10)^3$ -1000
4^3 64	$\left(\frac{5}{6}\right)^3$ $\frac{125}{216}$	$\left(\frac{7}{-8}\right)^3$ $-\frac{343}{512}$
1^3 1	0.3^3 0.027	1.1^3 1.331
$\sqrt[3]{8}$ 2	$\sqrt[3]{216}$ 6	$\sqrt[3]{-512}$ -8
$\sqrt[3]{216}$ 6	$\sqrt[3]{\frac{343}{343}}$ $\frac{7}{7} = 1$	$\sqrt[3]{\frac{27}{216}}$ $\frac{3}{6} = \frac{1}{2}$
$\sqrt[3]{27}$ 3	$\sqrt[3]{0.125}$ 0.5	$\sqrt[3]{0.000008}$ 0.02

2. Find the **volume** of a cube with each side length.

Basic	Intermediate	Advanced
1 m $1^3 = 1\,m^3$	10 cm $10^3 = 1000\,cm^3$	1.1 mm $1.1^3 = 1.331\,mm^3$

3. Find the **side length** of a cube with each volume.

Basic	Intermediate	Advanced
8 cm^3 $\sqrt[3]{8} = 2\,cm$	512 in^3 $\sqrt[3]{512} = 8\,in$	0.512 km^3 $\sqrt[3]{0.512} = 0.8\,km$