Geometry Name: _____

Homework – Radicals & Pythagorean Theorem Date: _____

Part 1 – Simplifying Radicals: Simplify each of the following radical expressions.

1. $\sqrt{52} =$

$\sqrt{4}\sqrt{13}$

$\boxed{2\sqrt{13}}$

2. $4\sqrt{54} =$

$4\sqrt{9}\sqrt{6}$

$4 \cdot 3\sqrt{6}$

$\boxed{12\sqrt{6}}$

3. $\sqrt{70} = \sqrt{70}$

Does not simplify!

4. $-2\sqrt{144} =$

$-2 \cdot 12$

$\boxed{-24}$

5. $\sqrt{72x^6y^9z} =$

$\sqrt{36}\sqrt{2}$

$\boxed{6x^3y^4\sqrt{2yz}}$

6. $3\sqrt{50x^4} =$

$3\sqrt{25}\sqrt{2}\,x^2$

$3 \cdot 5x^2\sqrt{2}$

$\boxed{15x^2\sqrt{2}}$

7. $-3\sqrt{28x^5y^3} =$

$-3\sqrt{4}\sqrt{7}\,x^5y^3$

$-3 \cdot 2\sqrt{7}\,x^5y^3$

$-6x^2y\sqrt{7xy}$

8. $-7\sqrt{24x^2y^8} =$

$-7\sqrt{4}\sqrt{6}\,x^2y^8$

$-7 \cdot 2xy^4\sqrt{6}$

$\boxed{-14xy^4\sqrt{6}}$

Part 2 – Multiplying Radicals: Simplify each of the following radical expressions using multiplication.

1. $\sqrt{3} \cdot \sqrt{7} =$

$\boxed{\sqrt{21}}$

2. $\sqrt{6} \cdot \sqrt{6} =$

$\sqrt{36}$

$\boxed{6}$

3. $4\sqrt{2}\left(6\sqrt{11}\right) =$

$\boxed{24\sqrt{22}}$

4. $\sqrt{6} \cdot \sqrt{9} =$

$\boxed{3\sqrt{6}}$

5. $\sqrt{2a^2} \cdot \sqrt{10a^3} =$

$\sqrt{20a^5}$

$\sqrt{4 \cdot 5a^5}$

$\boxed{2a^2\sqrt{5a}}$

6. $2\sqrt{12} \cdot \sqrt{6} =$

$2\sqrt{72}$

$2\sqrt{36}\sqrt{2}$

$2 \cdot 6\sqrt{2}$

$\boxed{12\sqrt{2}}$

7. $5\sqrt{11xy^3}\left(2\sqrt{3x^2y}\right) =$

$10\sqrt{33x^3y^4}$

$\boxed{10xy^2\sqrt{33x}}$

8. $2\sqrt{12} \cdot 3\sqrt{60} =$

$6\sqrt{720}$

$6\sqrt{144}\sqrt{5}$

$6 \cdot 12\sqrt{5}$

$\boxed{72\sqrt{5}}$

Part 3 – Dividing Radicals: Simplify each of the following radical expressions using division.

1. $\sqrt{\frac{72}{9}} = \sqrt{8}$

$\sqrt{4}\sqrt{2}$

$\boxed{2\sqrt{2}}$

2. $\sqrt{\frac{60}{15}} = \sqrt{4} = \boxed{2}$

3. $\frac{6\sqrt{5}}{3\sqrt{2}} = \frac{2\sqrt{5}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{2\sqrt{10}}{2} = \boxed{\sqrt{10}}$

4. $\frac{8}{\sqrt{27}} = \frac{8}{\sqrt{9}\sqrt{3}}$

$\frac{8}{3\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{8\sqrt{3}}{3 \cdot 3}$

$\boxed{\frac{8\sqrt{3}}{9}}$

5. $\frac{2\sqrt{2}}{3\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{6}}{3 \cdot 3}$

$\boxed{\frac{2\sqrt{6}}{9}}$

6. $\frac{\sqrt{8}^{1}}{\sqrt{32}_{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \boxed{\frac{1}{2}}$

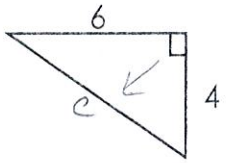
7. $\sqrt{\frac{20^{4}}{45_{9}}} = \frac{\sqrt{4}}{\sqrt{9}} = \boxed{\frac{2}{3}}$

8. $\frac{2\sqrt{20}}{7\sqrt{50}} = \frac{2\sqrt{2}}{7\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$\frac{2\sqrt{10}}{7 \cdot 5} = \boxed{\frac{2\sqrt{10}}{35}}$

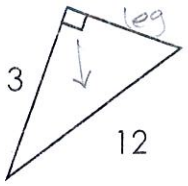
Part 4 – Pythagorean Theorem: Find the missing side. Write your answer in simplest radical form.

1. $2\sqrt{13}$



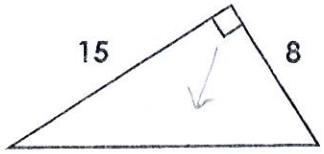
$6^2+4^2=c^2$
$36+16=c^2$
$52=c^2$
$c=\sqrt{52}$
$c=\sqrt{4}\sqrt{13}$
$c=2\sqrt{13}$

2. $3\sqrt{15}$



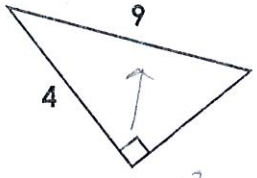
$3^2+b^2=12^2$
$9+b^2=144$
$b^2=135$
$b=\sqrt{135}$
$b=\sqrt{9}\sqrt{15}$
$b=3\sqrt{15}$

3. 17



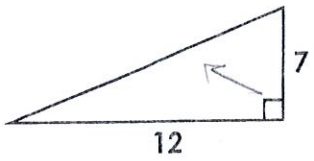
$8^2+15^2=c^2$
$64+225=c^2$
$289=c^2$
$c=\sqrt{289}$ $c=17$

4. $\sqrt{65}$



$4^2+b^2=9^2$
$16+b^2=81$
$b^2=65$
$b=\sqrt{65}$

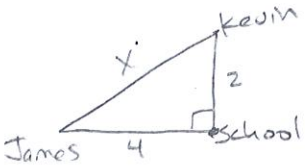
5. $\sqrt{193}$



$12^2+7^2=c^2$
$144+49=c^2$
$193=c^2$
$c=\sqrt{193}$

Part 5 – Pythagorean Theorem Applications: Draw a picture for each scenario. Put your answers in simplest radical form.

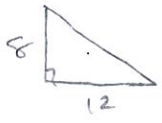
1. Kevin is standing 2 miles due north of the school. James is standing 4 miles due west of the school. What is the distance between Kevin and James?



$2^2+4^2=x^2$
$4+16=x^2$
$20=x^2$
$\sqrt{20}=x$
$x=\sqrt{4}\sqrt{5}$
$x=2\sqrt{5}$ miles

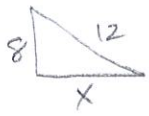
2. Two sides of a right triangle are 8 and 12.

A. Find the missing side if these are the lengths of the legs.



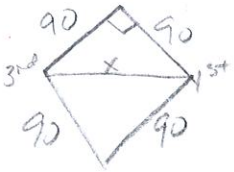
$8^2+12^2=c^2$
$64+144=c^2$
$208=c^2$
$c=\sqrt{208}$
$c=\sqrt{16}\sqrt{13}$
$c=4\sqrt{13}$

B. Find the missing side if these are the length so a leg and hypotenuse.



$8^2+x^2=12^2$
$64+x^2=144$
$x^2=80$
$x=\sqrt{80}$
$x=\sqrt{16}\sqrt{5}$
$x=4\sqrt{5}$

3. A baseball diamond is a square with sides of 90 feet. What is the shortest distance between first base and third base? Round to one decimal place.



$90^2+90^2=x^2$
$8100+8100=x^2$
$16,200=c^2$
$c\approx 127.3$ ft.