7.1N – Review Radicals and Triangle Properties

A. Simplifying Radicals

- Simplify the following:

1. $\frac{\cancel{7}\,1}{\cancel{21}\,7} = \boxed{\frac{1}{7}}$

2. $\frac{1\,\cancel{4x}}{1\,\cancel{4x^2}\,x} = \boxed{\frac{1}{x}}$

3. $\frac{\cancel{3}\sqrt{7}}{\cancel{3}} = \boxed{\sqrt{7}}$

4. $\sqrt{32}$
$\sqrt{2\cdot2\cdot2\cdot2\cdot2}$
$2\cdot2\sqrt{2}$
$\boxed{4\sqrt{2}}$
32, 4 8, 2 2 2 4, 2 2

5. $\sqrt{120}$
$\sqrt{2\cdot2\cdot2\cdot3\cdot5}$
$\boxed{2\sqrt{30}}$
120, 10 12, 2 5 3 4, 2 2

6. $4\sqrt{50}$
$4\sqrt{5\cdot5\cdot2}$
$5\cdot4\sqrt{2}$
$\boxed{20\sqrt{2}}$
50, 5 10, 5 2

7. $-5\sqrt{72}$
$-5\sqrt{2\cdot2\cdot2\cdot3\cdot3}$
$2\cdot3\cdot\cancel{5}\sqrt{2}$
$\boxed{-30\sqrt{2}}$
72, 9 8, 3 3 2 4, 2 2

8. $\sqrt{3}\cdot\sqrt{5}$
$\sqrt{15}$

9. $\sqrt{4}\cdot\sqrt{6} = \sqrt{24}$
$\sqrt{2\cdot2\cdot2\cdot3}$
$2\sqrt{6}$
24, 8 3, 2·2·2

10. $3\sqrt{7}\cdot3\sqrt{12}$
$9\sqrt{84}$
$9\sqrt{2\cdot2\cdot3\cdot7}$
$2\cdot9\sqrt{21} = \boxed{18\sqrt{21}}$
84, 7 12, 2 6, 2 3

11. $2\sqrt{5}\cdot3\sqrt{4}$
$6\sqrt{20}$
$6\sqrt{2\cdot2\cdot5}$
$2\cdot6\sqrt{5} = \boxed{12\sqrt{5}}$

12. $2\sqrt{3}\cdot\sqrt{3}$
$2\sqrt{9}$
3·3
$2\cdot3 = \boxed{6}$

13. $2\sqrt{5}\cdot7\sqrt{5}$
$14\sqrt{25}$
5·5
$14\cdot5 = \boxed{70}$

- Fill in the box with the number that makes the statement true.

1. $\sqrt{2}\cdot\square = 2$ — $\sqrt{2}$; $\sqrt{4} = 2$

2. $3\sqrt{7}\cdot\square = 21$ — $3\cdot7$, $\sqrt{7}$; $3\cdot7$

3. $\sqrt{12}\cdot\square = 6$ — $\sqrt{3}$; $\sqrt{36} = 6$; $\boxed{\sqrt{3}}$

4. $\frac{1}{2}\cdot\frac{\square}{\square} = \frac{5}{10}$ — 5, 5

5. $\frac{\sqrt{5}}{\sqrt{12}}\cdot\frac{\square}{\square} = \frac{\sqrt{15}}{\square}$ — $\sqrt{3}$, $\sqrt{3}$; $\sqrt{36}$ or 6

6. $\frac{3}{2\sqrt{2}}\cdot\frac{\square}{\square} = \frac{\square}{4}$ — $\sqrt{2}$, $\sqrt{2}$; $3\sqrt{2}$; $2\sqrt{4}$; $2\cdot2$

★A fraction is not simplified until there are no radicals in the denominator.

Examples: $\sqrt{49} = 7$

1. $\frac{6}{\sqrt{7}}\cdot\frac{\sqrt{7}}{\sqrt{7}} = \boxed{\frac{6\sqrt{7}}{7}}$; $\sqrt{49}$, 7·7

2. $\frac{\sqrt{7}}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{\sqrt{21}}{3}}$; $\sqrt{9}$, 3·3

3. $\frac{4\sqrt{2}}{\sqrt{20}}\cdot\frac{\sqrt{20}}{\sqrt{20}} = \frac{4\sqrt{40}}{20}$; $\sqrt{2\cdot2\cdot2\cdot5}$
$\frac{4\sqrt{2}}{\sqrt{20}}$, 10
$\frac{4}{\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}} = \frac{4\sqrt{10}}{10} = \boxed{\frac{2\sqrt{10}}{5}}$ $\boxed{\frac{2\sqrt{10}}{5}}$

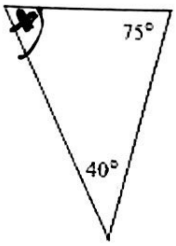
4. $\frac{\sqrt{8}\,4}{7\sqrt{10}\,5} = \frac{2}{7\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{2\sqrt{5}}{35}}$; 7·5

5. $\frac{\cancel{6}\sqrt{2}}{\cancel{3}\cancel{6}\,3} = \boxed{\frac{\sqrt{2}}{3}}$

6. $\frac{3\sqrt{16}}{2\sqrt{14}} = \frac{12\,6}{2\sqrt{14}}$
$= \frac{6}{\sqrt{14}}\cdot\frac{\sqrt{14}}{\sqrt{14}} = \frac{\cancel{6}\,3\sqrt{14}}{\cancel{14}\,7}$
$= \boxed{\frac{3\sqrt{14}}{7}}$

B. Sum of the angles in a triangle All ∠'s of Δ add up to 180°

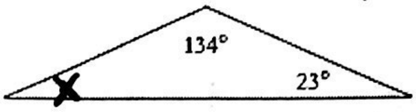
1.



$x = 180 - 40 - 75$

$\boxed{x = 65^\circ}$

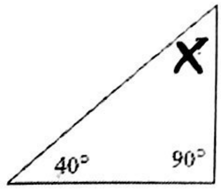
2.



$x = 180 - 134 - 23$

$\boxed{x = 23^\circ}$

3.

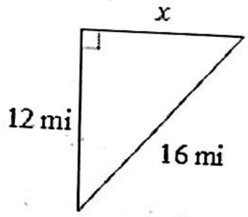


$x = 180 - 40 - 90$

$\boxed{x = 50^\circ}$

C. Use Pythagorean Theorem to find the missing side of a right triangle. $a^2 + b^2 = c^2$ ← use in Rt. Δ's

1.



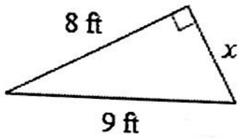
112
4 28
2 2 4 7
2 2

$12^2 + x^2 = 16^2$

$\sqrt{x^2} = \sqrt{112} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 7}$

$x = 2 \cdot 2\sqrt{7}$ $\boxed{4\sqrt{7}}$ mi

2.



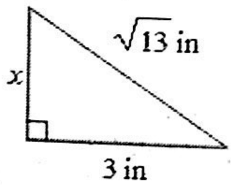
$8^2 + x^2 = 9^2$

64 81

$\sqrt{x^2} = \sqrt{17}$

$\boxed{x = \sqrt{17}}$ ft

3.



$3^2 + x^2 = (\sqrt{13})^2$

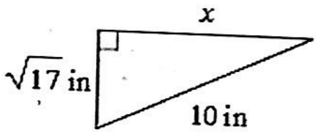
$3^2 + x^2 = 13$

9

$\sqrt{x^2} = \sqrt{4}$

$\boxed{x = 2}$ in

4.



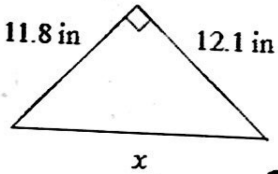
$(\sqrt{17})^2 + x^2 = 10^2$

$17 + x^2 = 100$

$\sqrt{x^2} = \sqrt{83}$

$\boxed{x = \sqrt{83}\text{ in}}$

5.

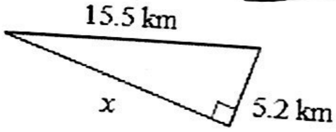


$11.8^2 + 12.1^2 = x^2$

$\sqrt{285.65} = \sqrt{x^2}$

$\boxed{16.9\text{ in} = x}$

6.



$5.2^2 + x^2 = 15.5^2$

$x^2 = 213.21$

$\boxed{x = 14.6\text{ km}}$

7. $a = 8km, \quad b = \sqrt{226}km$

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

290
29 10
29 5 2

$8^2 + (\sqrt{226})^2 = c^2$

$64 + 226 = c^2$

$\sqrt{290} = \sqrt{c^2}$

$\boxed{\sqrt{290} = c}$

8. $a = 12mi, \quad c = 14mi$

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

$12^2 + b^2 = 14^2$

13·2·2

$\sqrt{b^2} = \sqrt{52}$

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