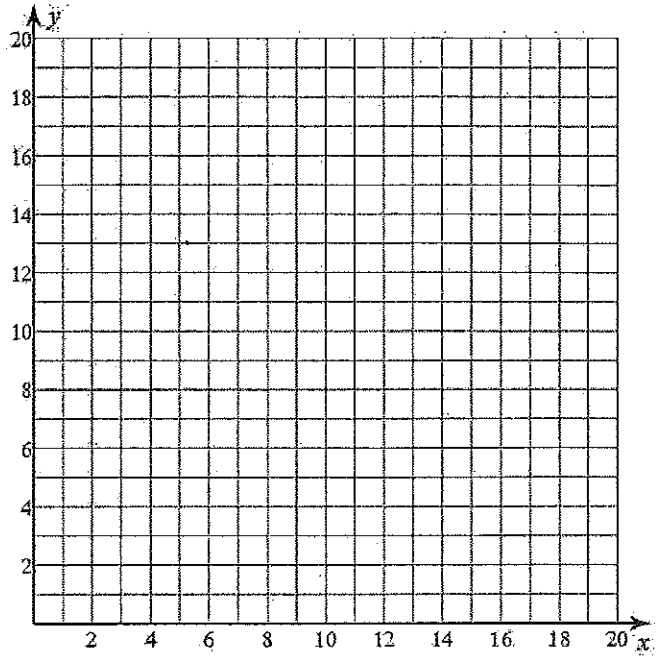
Pythagorean Theorem Extension Problems Name _____

For Exercises 1 and 2, use $\triangle ABC$ with coordinates $A(4, 14)$, $B(10, 6)$, and $C(16, 14)$.

1. Determine whether $\triangle ABC$ is scalene, isosceles, or equilateral. Find the perimeter of the triangle.
2. Find the midpoints M and N of $\overline{AB}$ and $\overline{AC}$ respectively. Find the slopes and lengths of $\overline{MN}$ and $\overline{BC}$. How do the slopes compare? How do the lengths compare?

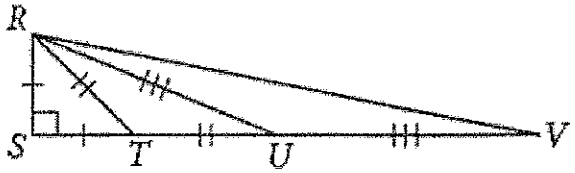


3. Draw a diagram to represent the situation.

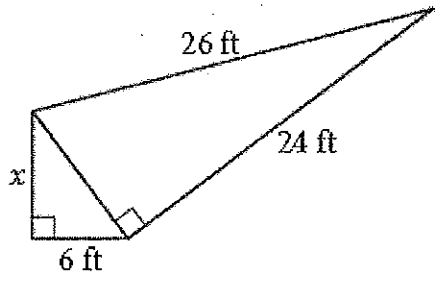
A 20 ft ladder reaches a window 18 ft high. How far is the foot of the ladder from the base of the building? How far must the foot of the ladder be moved to lower the top of the ladder by 2 ft?

4. and 5. Apply the Pythagorean Theorem.

$RS = 3$ cm. Find RV.



5.



Pythagorean Theorem Extension Problems Name _____

For Exercises 1 and 2, use $\triangle ABC$ with coordinates $A(4, 14)$, $B(10, 6)$, and $C(16, 14)$.

1. Determine whether $\triangle ABC$ is scalene, isosceles, or equilateral. Find the perimeter of the triangle.

$MN = 5$ units $BC = 10$ units

2. Find the midpoints M and N of $\overline{AB}$ and $\overline{AC}$ respectively. Find the slopes and lengths of $\overline{MN}$ and $\overline{BC}$. How do the slopes compare? How do the lengths compare?

MN is HALF BC

Slope $(MN) = \frac{4}{3}$ slope $(BC) = \frac{4}{3}$

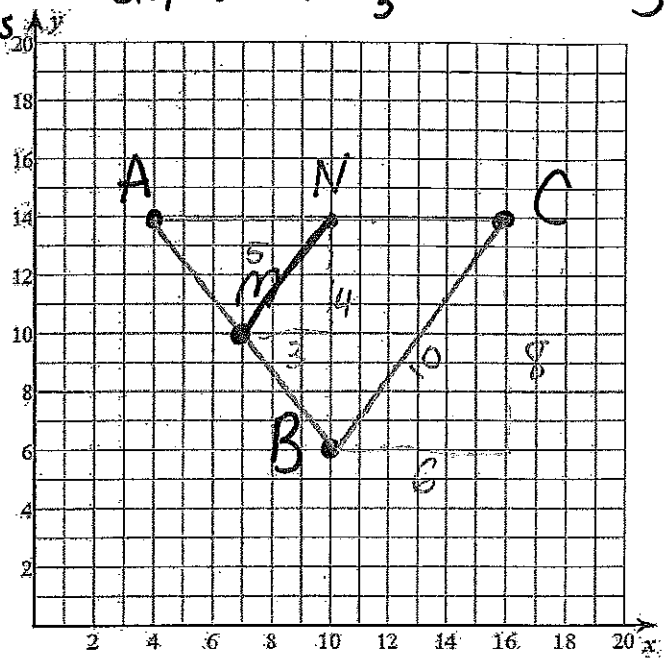
$AC = \sqrt{(16-4)^2 + (14-14)^2} = \sqrt{12^2} = 12$ units

$BC = \sqrt{(16-10)^2 + (14-6)^2}$

$= \sqrt{6^2 + 8^2} = \sqrt{100} = 10$ units

$AB = \sqrt{(10-4)^2 + (6-14)^2}$

$= \sqrt{6^2 + 8^2} = \sqrt{100} = 10$ units



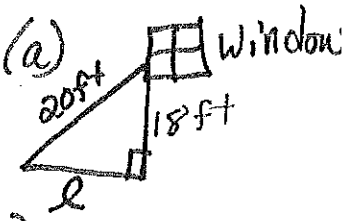
$M = \left(\frac{4+10}{2}, \frac{14+6}{2}\right)$ $N = \left(\frac{4+16}{2}, \frac{14+14}{2}\right)$

$M = (7, 10)$ $N = (10, 14)$

3. Draw a diagram to represent the situation.

A 20 ft ladder reaches a window 18 ft high. How far is the foot of the ladder from the base of the building? (a) How far must the foot of the ladder be moved to lower the top of the ladder by 2 ft? (b)

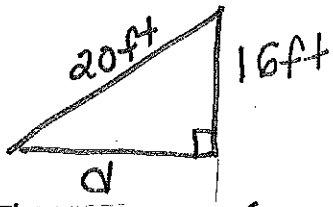
(a)



$\sqrt{l^2} = \sqrt{20^2 - 18^2} = l$

$\sqrt{l^2} = \sqrt{76}$ feet $= l$

$l \approx 8.72$ ft



$20^2 = 16^2 + d^2$

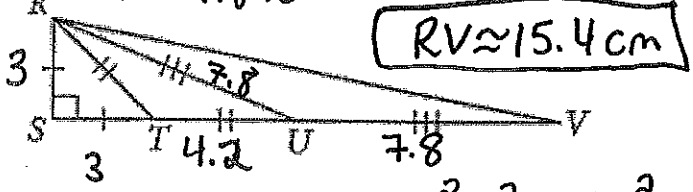
$d^2 = 20^2 - 16^2$

$d = \sqrt{20^2 - 16^2} = \sqrt{144} = 12$ ft

4. and 5. Apply the Pythagorean Theorem.

$RS = 3$ cm. Find RV.

$RT = \sqrt{18} \approx 4.2$ cm



$RV \approx 15.4$ cm

$RV \approx \sqrt{3^2 + 7.2^2}$

$RV \approx \sqrt{61.5}$

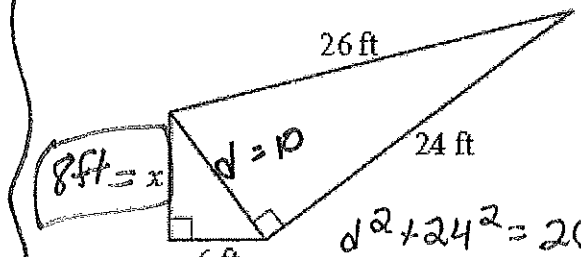
$RV \approx 7.8$ cm

$RV^2 = 3^2 + 15.1^2$

$RV^2 = 235.2$

$RV \approx 15.4$ cm

5.



$x^2 + 6^2 = 10^2$

$x^2 = 10^2 - 6^2$

$x = \sqrt{100 - 36}$

$x = \sqrt{64} = 8$ ft

$d^2 + 24^2 = 26^2$

$d^2 = 26^2 - 24^2$

$d = \sqrt{676 - 576}$

$d = \sqrt{100} = 10$