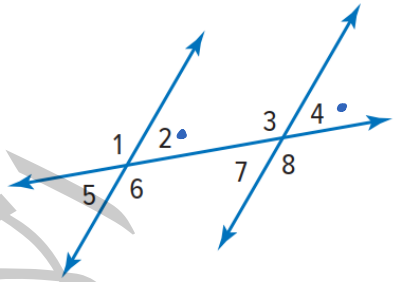
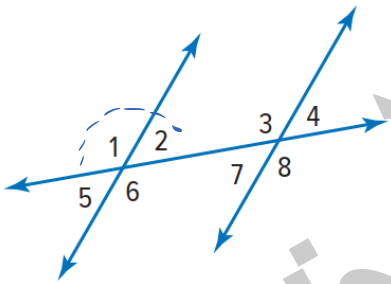
Classify each pair of angles as *alternate interior*, *alternate exterior*, or *corresponding*. (Examples 1 and 2)



1. ∠2 and ∠4

Corresponding Angles

2. ∠4 and ∠5 → Alternate exterior Angles



* ∠1 , ∠2 → Supplementary
* ∠2 , ∠5 → Vertical
* ∠2 , ∠7 → Alternate interior
* ∠1 , ∠8 → Alternate exterior

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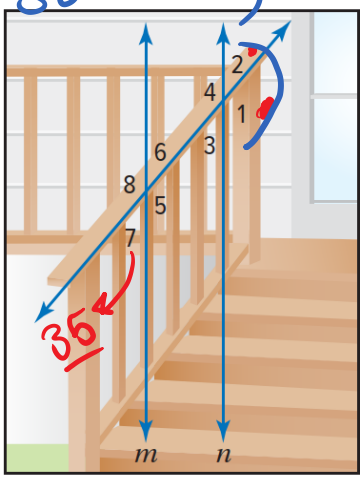
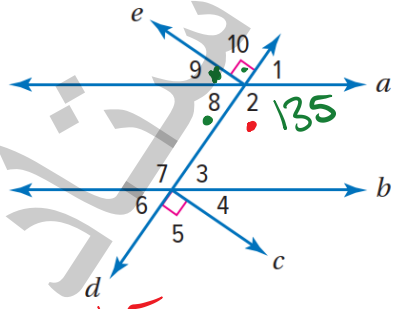
1. Refer to the porch stairs shown. Line m is parallel to line n and $m\angle 7$ is 35°. Find the measure of $\angle 1$. Justify your answer. (Example 3)

$\angle 2, \angle 7$ Alternate exterior are equal $\rightarrow \angle 2 = 35$

$m\angle 1 = 180 - 35 = 145^\circ$



Refer to the figure at the right. Line a is parallel to line b and $m\angle 2$ is 135°. Find each given angle measure. Justify your answer. (Examples 1, 2, and 4)



$\angle 9, \angle 8$ are right

$\angle 2, \angle 8$ are Supplementary

$= 180$

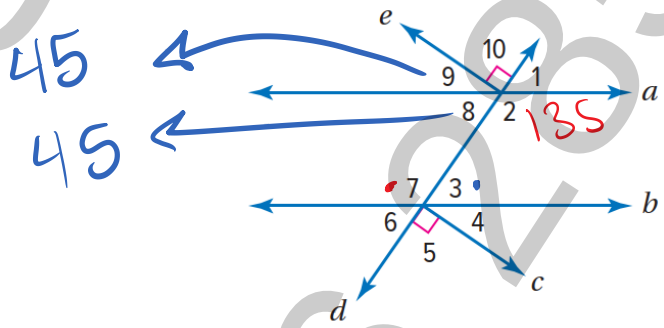
2. $m\angle 9$

$m\angle 8 = 180 - 135 = 45$

$m\angle 9 + m\angle 8 = 90$

$m\angle 9 + 45 = 90$

$m\angle 9 = 90 - 45 = 45^\circ$



3. $m\angle 7$

$\angle 7, \angle 2$ are Alternate interior are $=$

$m\angle 7 = m\angle 2 = 135^\circ$

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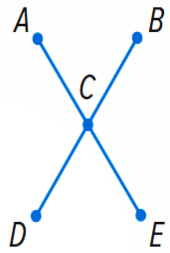
11. In the diagram shown, $\overline{AE}$ intersects $\overline{DB}$ at C.

linear pair = supplementary



Determine if each of the following conclusions will always be true. Select yes or no.

a. $m\angle ACD = m\angle BCE$ are vertical ☑ Yes ☐ No

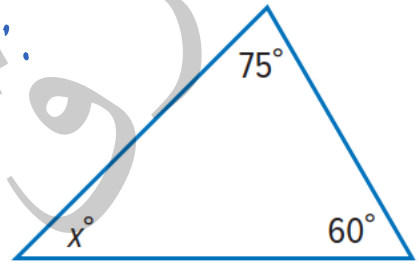
b. $\angle ACD$ and $\angle ECD$ form a linear pair. ☑ Yes ☐ No

c. $\angle DCE$ and $\angle ACB$ are vertical angles. ☑ Yes ☐ No

d. $\angle ACB$ and $\angle BCE$ are complementary angles. ☐ Yes ☑ No

right = 90° =

1. Find the value of x in the triangle. (Example 1)



$x + 75 + 60 = 180$

$x = 180 - 75 - 60$

$x = 45°$

2. What is the value of x in the sail of the sailboat? (Example 1)

$x = 180 - 70 - 20$

$x = 90°$

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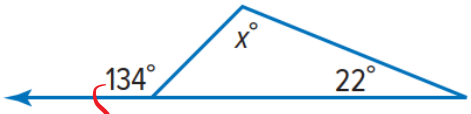
Find the value of *x* in each triangle. (Example 3)

5. _____



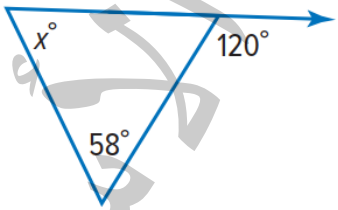
exterior angle

$134 = x + 22$

$x = 134 - 22$

$\boxed{x = 112^\circ}$

6. _____



$120 = x + 58$

$120 - 58 = x$

$\boxed{x = 62^\circ}$

7. _____

exterior

$\boxed{170 = x + 125}$

$170 - 125 = x^\circ$

$x = 45$

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Find the sum of the interior angle measures of each polygon. (Example 1)

1. pentagon $n=5$

$S=(n-2)180$

$S=(5-2)\times 180$

$S=3\times 180$

$S=540^\circ$

2. 11-gon $n=11$

$S=(11-2)\times 180$

$S=9\times 180$

$S=1620^\circ$

3 13-gon $n=13$

$S=(13-2)\times 180$

$S=11\times 180$

$S=1980^\circ$

Find the measure of one interior angle in each regular polygon. Round to the nearest tenth if necessary.

19. nonagon $n=9$

20. decagon $n=10$

21. 19-gon

22. 16-gon

19

1 $S=(n-2)\times 180=(9-2)\times 180=7\times 180=1260$

2 $\frac{S}{n}=\frac{1260}{9}=140^\circ$

20 $S=(10-2)\times 180=8\times 180=1440$

$\frac{S}{n}=\frac{1440}{10}=144^\circ$

21 $n=19 \rightarrow S=(19-2)\times 180=17\times 180=3060$

$\frac{S}{n}=\frac{3060}{19}=161.05$

22 $n=16 \rightarrow S=(16-2)\times 180=14\times 180=2520$

$\frac{S}{n}=\frac{2520}{16}=157.5^\circ$

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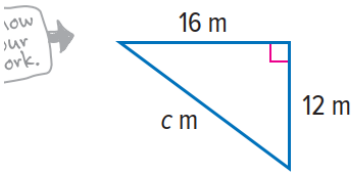
Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary. (Examples 1 and 2)

1.

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

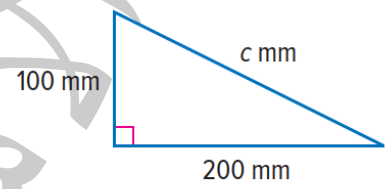


$c^2 = 16^2 + 12^2$

$c^2 = 400$

$c = \sqrt{400} = 20$

2.

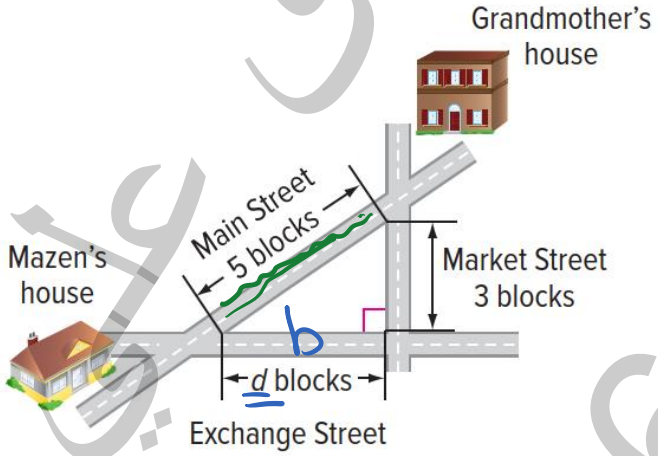


$c^2 = 100^2 + 200^2$

$c^2 = 50\,000$

$c = \sqrt{50\,000} = 223.6$

14. Mazen wants to go from his house to his grandmother's house. How much distance is saved if he takes Main Street instead of Market and Exchange?



$c = 5$, $a = 3$

$b = d$

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

$5^2 = 3^2 + d^2$

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

$d^2 = 16$

$d = \sqrt{16} = 4$ blocks

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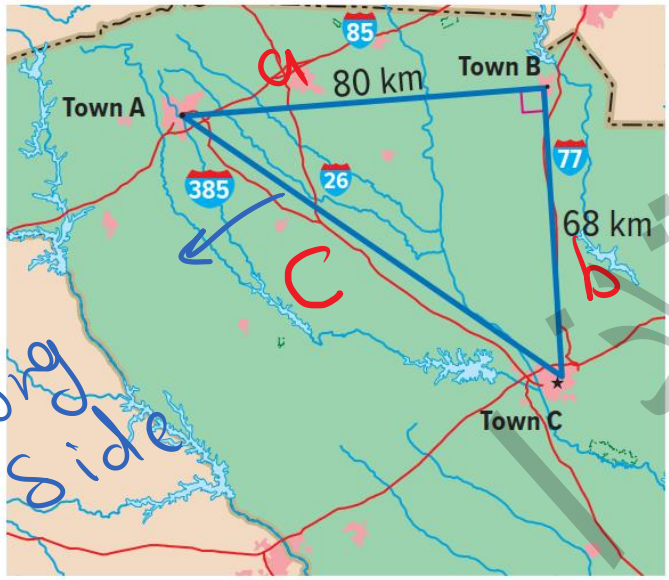
15. Suppose three towns form a right triangle. What is the distance between the two towns that form the hypotenuse?



long side

$c \rightarrow ??$

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

$c^2 = 80^2 + 68^2$

$c^2 = 11024$

$c = \sqrt{11024}$

$c = 104.9$

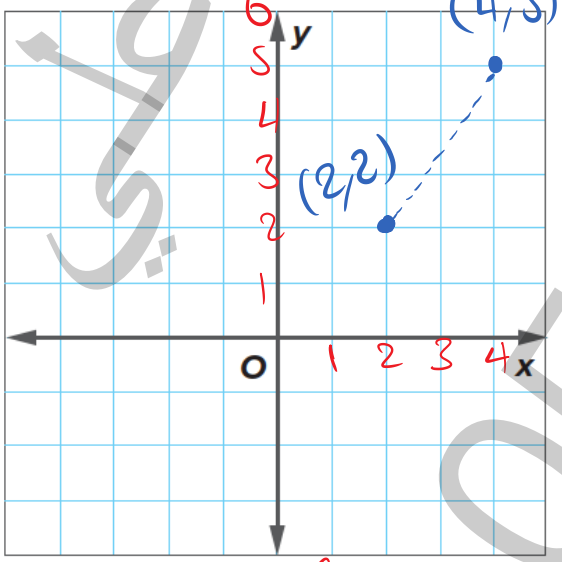
≈ 105

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Graph each pair of ordered pairs. Then find the distance between the points. Round to the nearest tenth if necessary. (Example 1)

1. (4, 5), (2, 2)

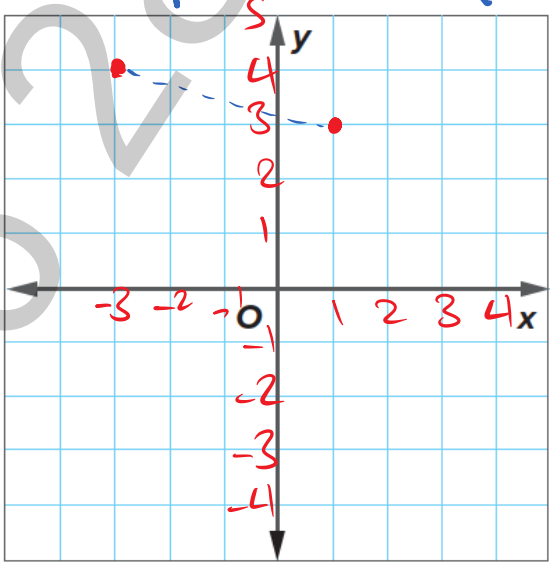
$d = \sqrt{(4-2)^2 + (5-2)^2}$



$d = 3.6$

2. (−3, 4), (1, 3)

$d = \sqrt{(-3-1)^2 + (4-3)^2}$



$d = 4.1$

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Use the Distance Formula to find the distance between each pair of points. Round to the nearest tenth if necessary. (Example 3)

x_1 y_1 x_2 y_2

6. $Y(3.5, 1), Z(-4, 2.5)$

7. $K\left(8\frac{1}{2}, 12\right), L\left(-6\frac{3}{4}, 7\frac{1}{2}\right)$

⑥

$$d = \sqrt{(3.5 - -4)^2 + (1 - 2.5)^2}$$

$$d = 7.6$$

⑦

$$d = \sqrt{\left(8\tfrac{1}{2} - -6\tfrac{3}{4}\right)^2 + \left(12 - 7\tfrac{1}{2}\right)^2}$$

$$d = 15.9$$

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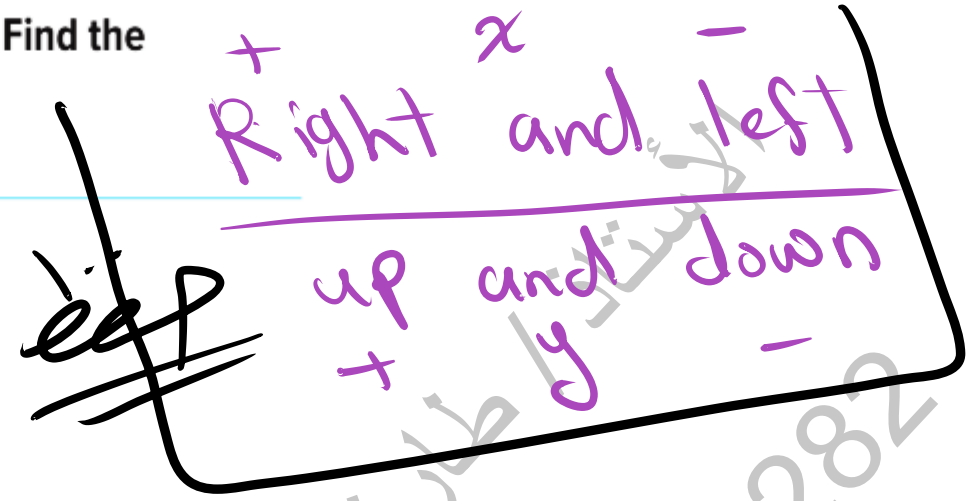
Triangle *PQR* has vertices *P*(0, 0), *Q*(5, −2), and *R*(−3, 6). Find the vertices of *P'Q'R'* after each translation. (Example 2)



3. 6 units right and 5 units up

+x +y

$P'(0+6, 0+5) = (6, 5)$

$Q'(5+6, -2+5) = (11, 3)$

$R'(-3+6, 6+5) = (3, 11)$

4. 8 units left and 1 unit down

-x -y

$P'(0-8, 0-1) = P'(-8, -1)$

$Q'(5-8, -2-1) = Q'(-3, -3)$

$R'(-3-8, 6-1) = R'(-11, 5)$

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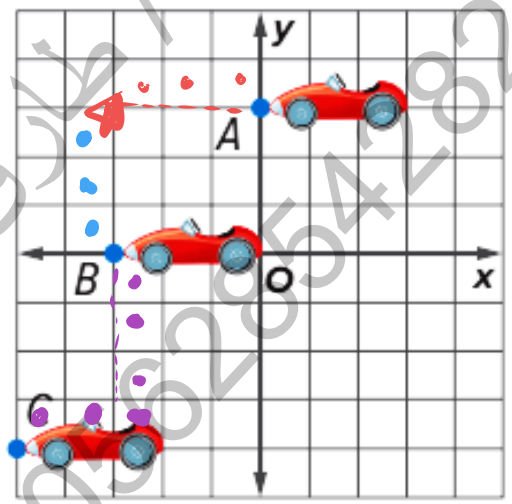
Use the image of the race car at the right. (Example 3)

5. Use translation notation to describe the translation from point *A* to point *B*.

Translation go to left 3units and 3 units down

6. Use translation notation to describe the translation from point *B* to point *C*.

4units down and 2 units left



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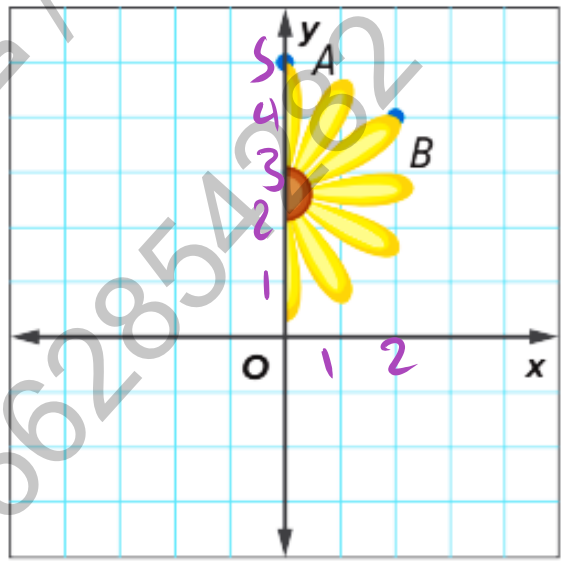
2. The figure is reflected over the y-axis. Find the coordinates of point A′ and point B′. Then sketch the image on the coordinate plane. (Example 3)



Change Sign for x

$A(0,5) \rightarrow A'(0,5)$

$B(2,4) \rightarrow B'(-2,4)$

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Graph each figure and its reflection over the indicated axis. Then find the coordinates of the reflected image. (Examples 1 and 2)

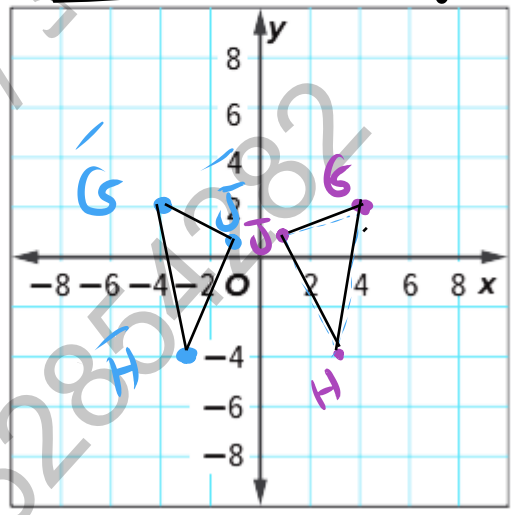
1 △GHJ with vertices G(4, 2), H(3, −4), and J(1, 1) over the y-axis

Change sign of x

G(−4, 2)

H(−3, −4)

J(−1, 1)



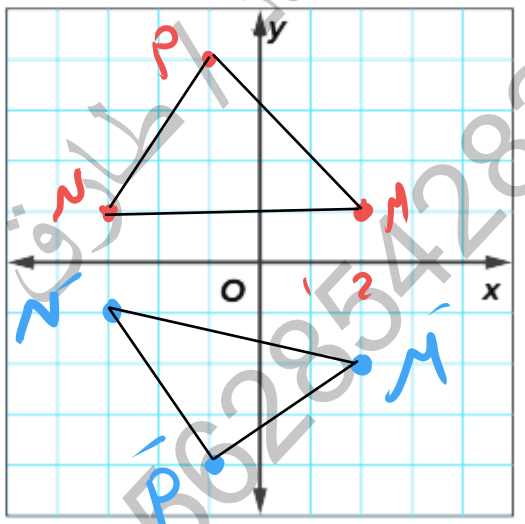
2. △MNP with vertices M(2, 1), N(−3, 1), and P(−1, 4) over the x-axis

Change sign of y

M(2, −1)

N(−3, −1)

P(−1, −4)



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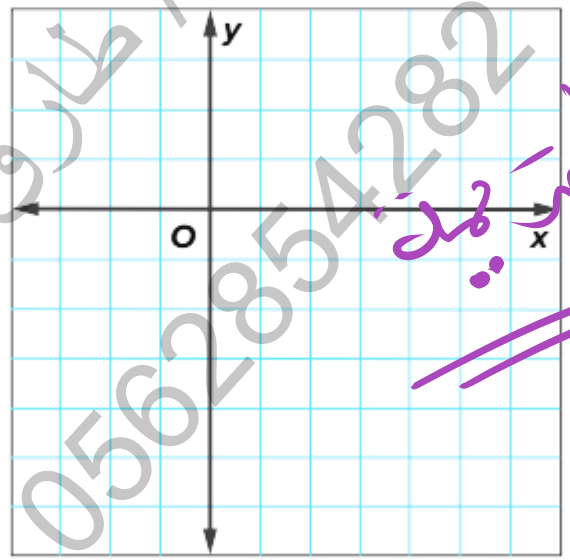
Triangle XYZ has vertices $X(3, -1)$, $Y(5, -4)$, and $Z(1, -5)$. Graph $\triangle XYZ$ and its image after each rotation. Then give the coordinates of the vertices for $\triangle X'Y'Z'$. (Examples 1 and 2)

Change sign of x and y

1. 270° counterclockwise about vertex X

Show your work.

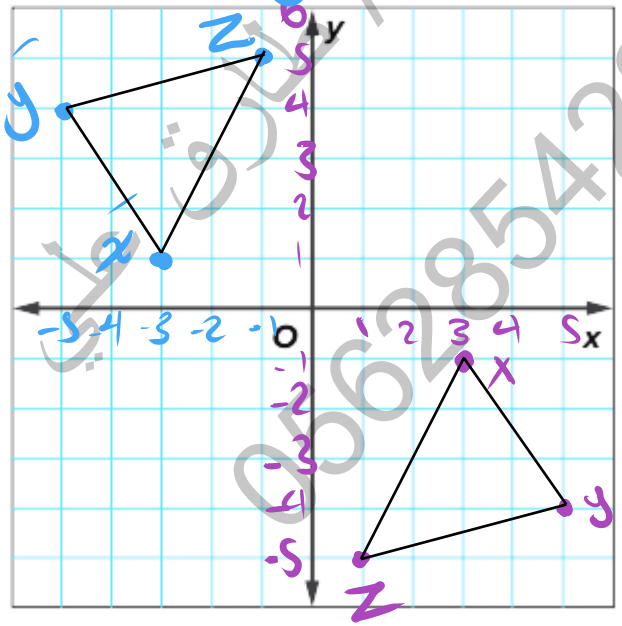


منظر

في المراجعة القديمة

2. 180° clockwise about the origin

$\bar{x}(-3,1)$, $\bar{y}(-5,4)$ $\bar{z}(-1,5)$



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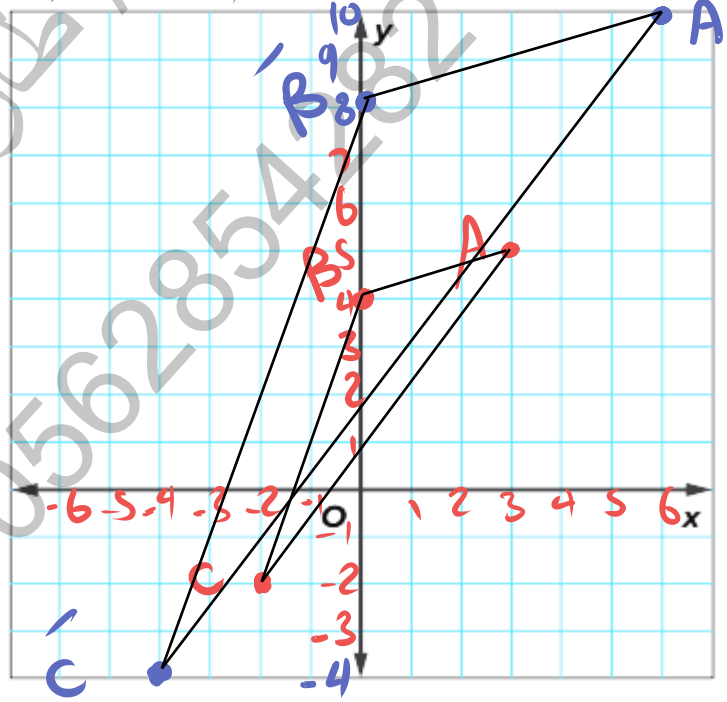
Find the coordinates of the vertices of each figure after a dilation with the given scale factor *k*. Then graph the original image and the dilation.

(Examples 1 and 2)

ضرب

1. A(3, 5), B(0, 4), C(−2, −2); k = 2

A′(6, 10), B′(0, 8), C′(−4, −4)



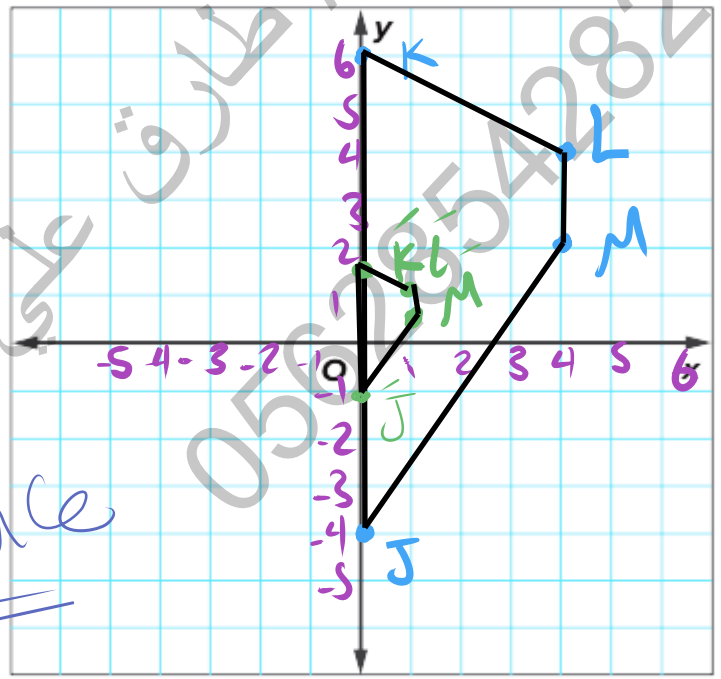
الصورة أصغر

reduce

2. J(0, −4), K(0, 6), L(4, 4), M(4, 2); k = $\frac{1}{4}$

J′(0, −1) K′(0, 1.5), M′(1, 0.5)

L′(1, 1)



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3. A graphic designer created a logo on $21\frac{1}{4}$- by $27\frac{1}{2}$-centimeter paper. In order to be placed on a business card, the logo needs to be $4\frac{1}{4}$ centimeters by $5\frac{1}{2}$ centimeters. What is the scale factor of the dilation? (Example 3)

pre

image

Scale factor $\Rightarrow K = \frac{\text{image}}{\text{preimage}}$

$K = \frac{4\frac{1}{4}}{21\frac{1}{4}}$

$K = \frac{1}{5}$

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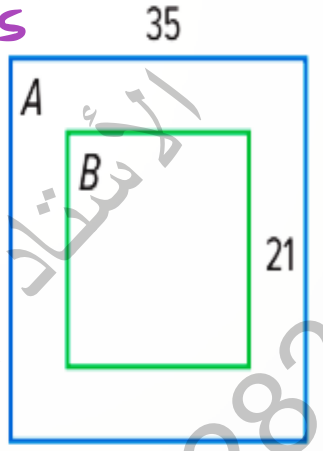
15. Squares A and B are related by a dilation. Determine if each statement is true or false.



a. The scale factor from figure A to figure B is $\frac{3}{5}$. ☑ True ☐ False

b. The scale factor from figure B to figure A is $\frac{5}{3}$. ☑ True ☐ False

c. The dilation from figure A to figure B is an enlargement. ☐ True ☑ False

(a) image $k = \frac{B}{A} = \frac{21}{35} = \frac{3}{5}$

(b) A image $k = \frac{A}{B} = \frac{35}{21} = \frac{5}{3}$

(c) reduction

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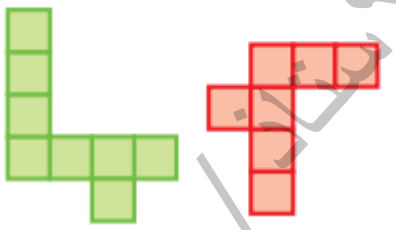
Determine if the two figures are congruent by using transformations. Explain your reasoning.

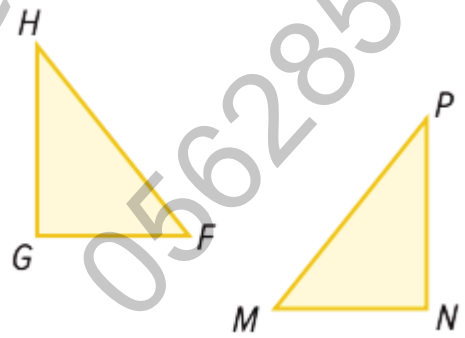
10.



Translation rotation reflection

not Congruent

11.



Congruent and reflection then Translation

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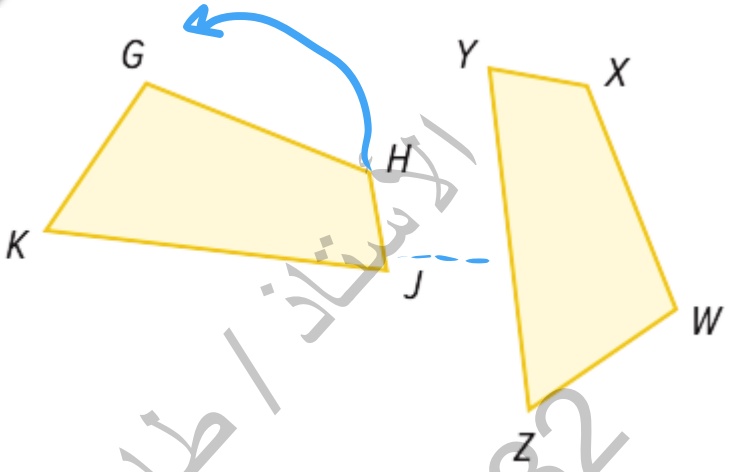
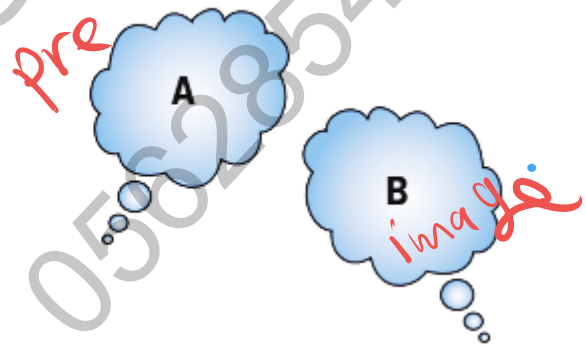
12.



Congruent

reflection, rotation 90° counterclockwise and Translation

13. Ismail is illustrating a graphic novel for a friend. He is using the two thought bubbles shown. What transformations did he use if Figure A is the preimage and Figure B is the image?



A to B

reflection and Translation

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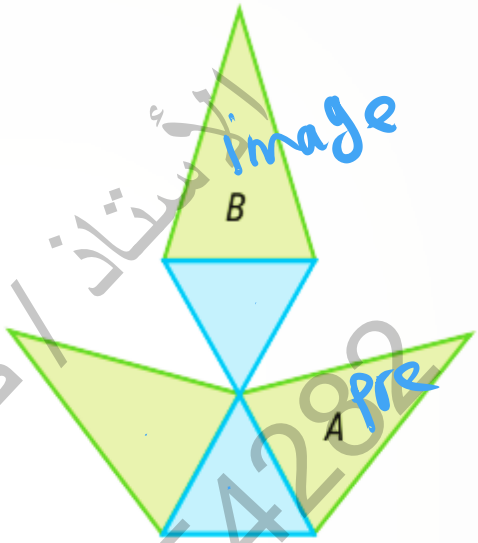
15. Usama is creating a mosaic for art class. He started by using triangular tiles as shown.

Triangles *A* and *B* are congruent. Describe possible transformations he could have used if triangle *A* is the preimage and triangle *B* is the image?



Rotation Then Translation

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4. In the umbrella shown at the right, $\triangle JLK \cong \triangle NLM$. (Example 3)

a. If $m\angle JKL = 66°$, then $m\angle NML =$ _____.

b. If $MN = 35$ centimeters, then $KJ =$ _____.

Congruent

ⓐ 66

ⓑ 35

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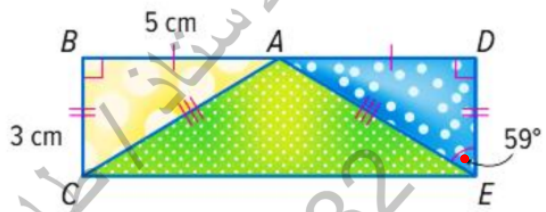
14. In the quilt design shown, $\triangle ABC \cong \triangle ADE$. What is the measure of $\angle BCA$?



$= 59^\circ$

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056 285 42 82 الأستاذ / طارق علي

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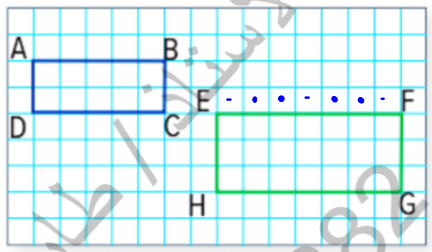
Determine if the two figures are similar by using transformations. Explain your reasoning. (Examples 1 and 2)

1.



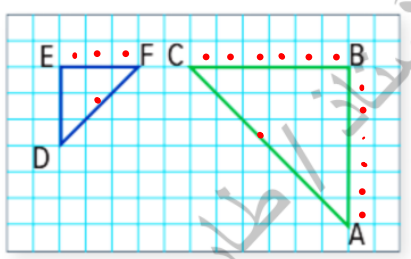
Show your work.

$\frac{AB}{EF} = \frac{5}{7}$, $\frac{AD}{EH} = \frac{2}{3}$

$\frac{5}{7} \neq \frac{2}{3}$

So The figures are not Similar

2.



$\frac{EF}{CB} = \frac{3}{6} = \frac{1}{2}$

$\frac{ED}{BA} = \frac{3}{6} = \frac{1}{2}$

$\frac{1}{2} = \frac{1}{2}$

Similar

Translation - reflection

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Example

3. Hamad enlarges the photo shown by a scale factor of 2 for his webpage. He then enlarges the webpage photo by a scale factor of 1.5 to print. If the original photo is 5 centimeters by 7.5 centimeters, what are the dimensions of the print? ①

② Are the enlarged photos similar to the original?

$5 \times 2 = 10$

$7.5 \times 2 = 15$

$\Rightarrow$

$10 \times 1.5 = 15$

$15 \times 1.5 = 22.5$

Yes always Similar

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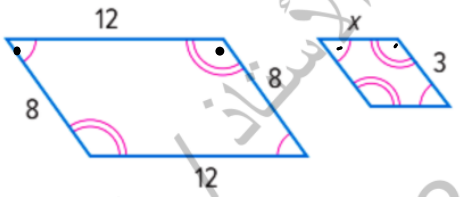
Each pair of polygons is similar. Determine the transformations that map one figure onto the other. Then find the missing side measures. (Example 2)

3



*Translation Then dilation

$\frac{x}{12} = \frac{3}{8}$

$\frac{8x}{8} = \frac{3 \cdot 12}{8}$

$x = \frac{3 \cdot 12}{8} = \frac{9}{2} = 4.5$

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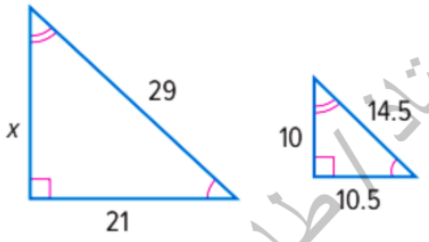
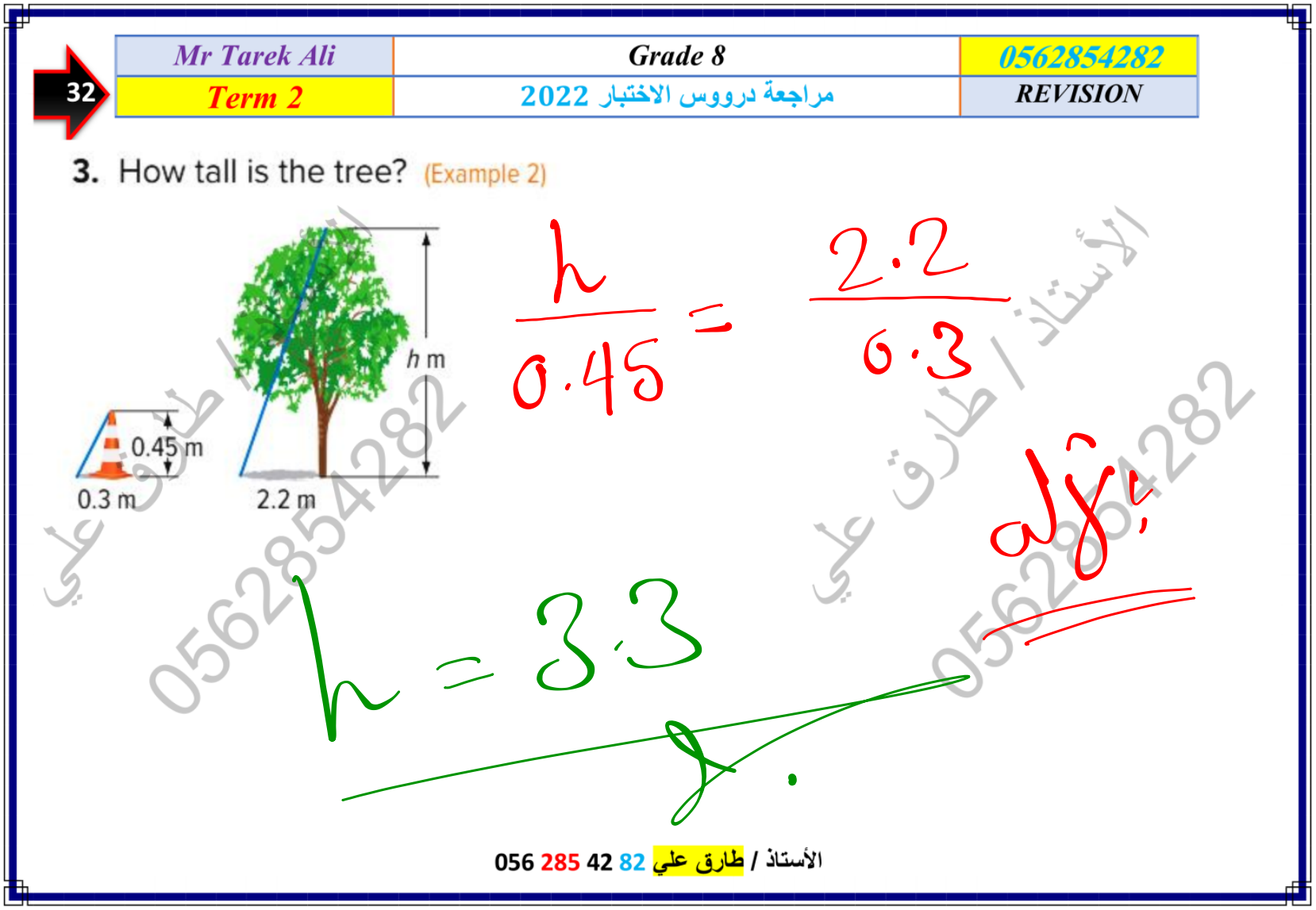
4.



* Translation - dilation

$\frac{x}{10} = \frac{29}{14.5}$

$x = 20$



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3. How tall is the tree? (Example 2)

$$\frac{h}{0.45} = \frac{2.2}{0.3}$$

$$h = 3.3$$

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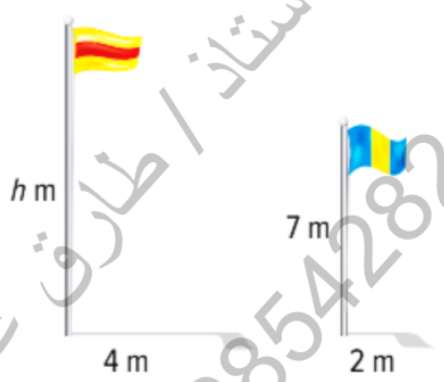
4. How tall is the taller flagpole? (Example 2)



$$\frac{h}{7} \times \frac{4}{2}$$

إضغاث

$$\frac{2h}{2} = \frac{4 \cdot 7}{2} \Rightarrow \boxed{h = 14}$$

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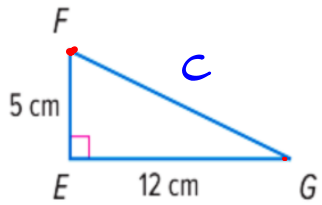
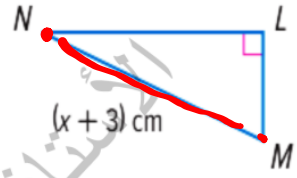
6. In the figure at the right, $\triangle EFG \cong \triangle LMN$. Find the value of x. Then describe the transformations that map $\triangle EFG$ onto $\triangle LMN$.





Translation then rotation

NM ≅ FG but I did not have

$c^2 = a^2 + b^2 \Leftarrow$ FG

$c^2 = 12^2 + 5^2 \Rightarrow c^2 = 169 \Rightarrow c = \sqrt{169}$

$c = 13$

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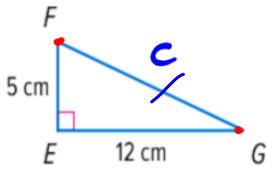

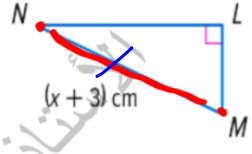

$FG = 13$

$NM \cong FG$

$x + 3 = 13$

$x + 3 = 13$

$-3 \quad -3$

$x = 10$

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3 The plans for a skateboard ramp are shown. Use two points to find the slope of the ramp. Then verify that the slope is the same at a different location by choosing a different set of points. (Example 2)

* Slope 1 → m_1

G (1 , 7) , H (6 , 5)

$m_1 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-5}{1-6} = \frac{-2}{5}$

* Slope 2 J (11 , 3) , K (16 , 1)

$m_2 = \frac{3-1}{11-16} = \frac{-2}{5}$

We Same

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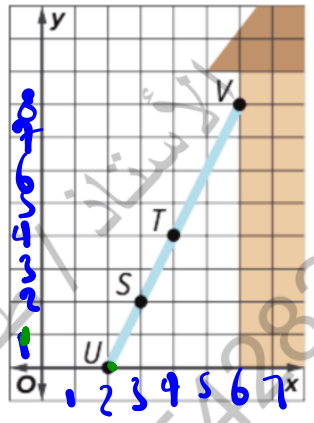
4. A ladder is leaning up against the side of a house. Use two points to find the slope of the ladder. Then verify that the slope is the same at a different location by choosing a different set of points.

(Example 2)



$V(6,8)$, $T(4,4)$

$m_1 = \frac{8-4}{6-4} = 2$

$U(2,0)$, $S(3,2)$

$m_2 = \frac{0-2}{2-3} = 2$ are Same

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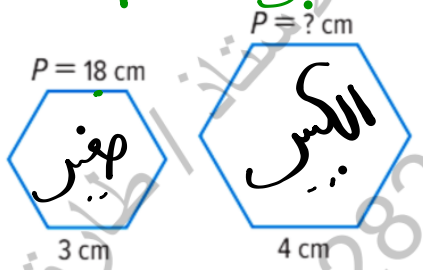
For each pair of similar figures, find the perimeter of the second figure.

(Example 1)

$K = \frac{\text{كبير}}{\text{صغير}} = \frac{4}{3}$

1.

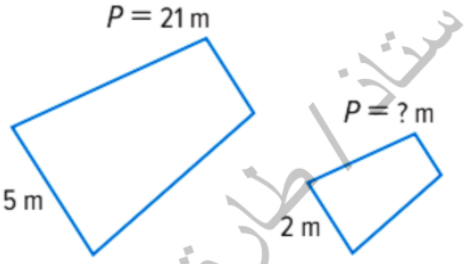


لو باز الكبير وضرب
لو باز الصغير نقسم

$P_{Big} = P \times K$

$P = 18 \times \frac{4}{3} = 24$

2.



$K = \frac{5}{2}$

صغير نقسم.

$P_{small} = \frac{P}{K}$

$P_{small} = \frac{21}{\frac{5}{2}}$

$P = 8.4$

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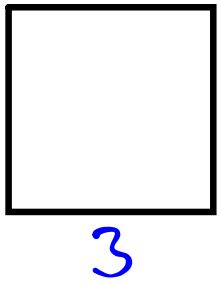

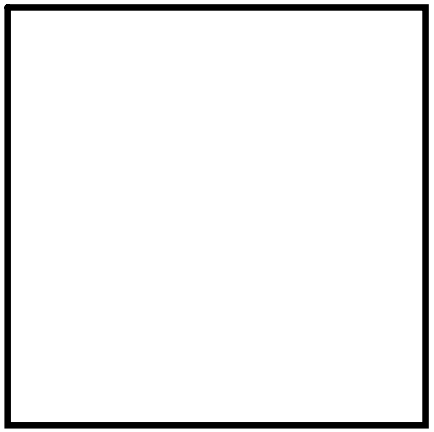

Area المساحة

A = ??

لو باين الكبير

$A_{Big} = A_{Small} \times K^2$

لو باين الصغير

$A_{Small} = \frac{A_{Big}}{K^2}$

$A_{small} = 6$, $A_{Big} = ??$

Side = 3 Side = 12

$$A_{Big} = A_{small} \times K^2$$

$$A_{Big} = 6 \times \left(\frac{12}{3}\right)^2$$

$$= 96 \text{ m}^2$$