# WARM UP
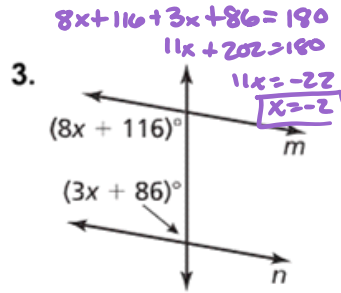
**Find the value of $x$ that makes $m \parallel n$.**

1.

$\boxed{110 = x}$

$110°$

$m$

$n$

$x°$

2.

$2x - 8 = x + 20$

$\boxed{x = 28}$

$(2x - 8)°$   $m$

$(x + 20)°$

$n$

3.

$8x + 116 + 3x + 86 = 180$

$11x + 202 = 180$

$11x = -22$

$\boxed{x = -2}$

$(8x + 116)°$   $m$

$(3x + 86)°$

$n$
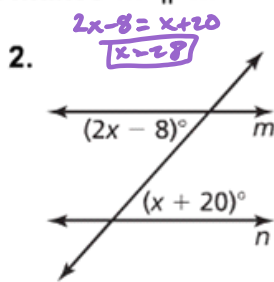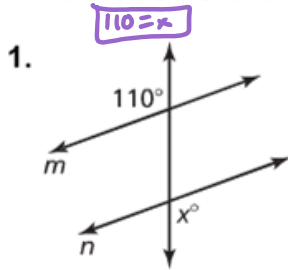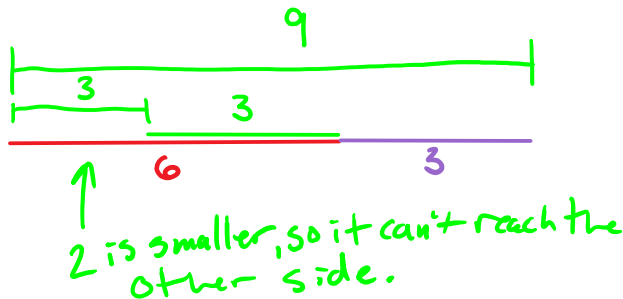
# ESSENTIAL QUESTION

What are some relationships between the sides and angles of any triangle?

GOAL: "I CAN...

**Use theorems to compare the sides and angles of any triangle."**

Is it possible to make a triangle using side lengths of 2, 3, and 6? Come up with an answer with your group and then find some way of proving your idea.

9

3

3

6    3

2 is smaller, so it can't reach the other side.

# EXAMPLE 1

- Plot Triangle ABC with the following coordinates: A(0,0), B(3,6), C(12,0)

$AB = \sqrt{3^2 + 6^2} = \sqrt{9 + 36} = \sqrt{45} \approx 6.7$   $BC = \sqrt{6^2 + 9^2} = \sqrt{36 + 81} = \sqrt{117} \approx 10.3$

- Find the distance from A to B, from B to C and from C to A.

$AC = 12$

C(12,0)

- Find the distance from A to B, from B to C and from C to A.
- Visually which angle appears to be the largest? **B seems largest**
- Visually which angle appears to be second largest? **A seems 2nd.**
- Do you see a correlation between the size of the angle and the **C is smallest.**
  size of the side? **Largest Side is opp. Largest ∠.**
- Plot Triangle RST with the following coordinates: R(0,0), S(0,9),
  T(4,0)
- Repeat the steps from above to see if you see a correlation
  between angle size and size of the side. (Because there is.)

$AB = \sqrt{3^2 + 6^2} = \sqrt{9+36} = \sqrt{45} \approx 6.7$  $BC = \sqrt{6^2+9^2} = \sqrt{36+81} = \sqrt{117} \approx 10.3$
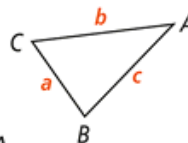
$AC = 12$
$\overline{AB} \approx 6.7$
$\overline{BC} \approx 10.3$

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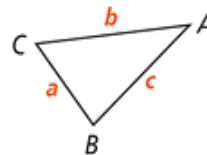| | | |
|---|---|---|
| If two sides of a triangle are not congruent, then the larger angle lies opposite the longer side. | If... $b > a$ |  |
| PROOF: SEE EXERCISE 13. | Then... $m\angle B > m\angle A$ | |
| If two angles of a triangle are not congruent, then the longer side lies opposite the larger angle. | If... $m\angle B > m\angle A$ |  |
| PROOF: SEE EXAMPLE 3. | Then... $b > a$ | |

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To support a triangular piece of a float, a brace is placed at the largest angle and a guide wire is placed at the smallest angle. Which angle is the largest? Which angle is the smallest?
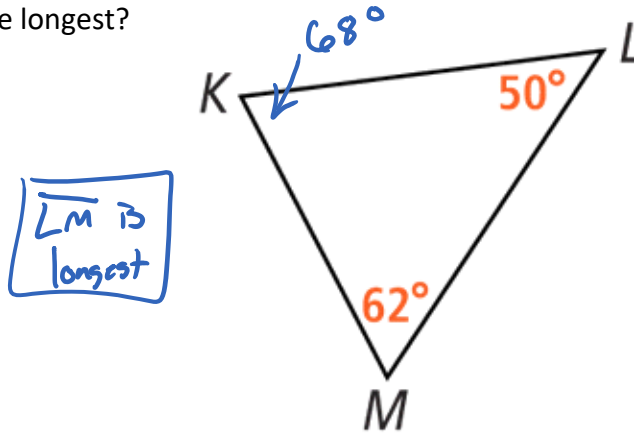


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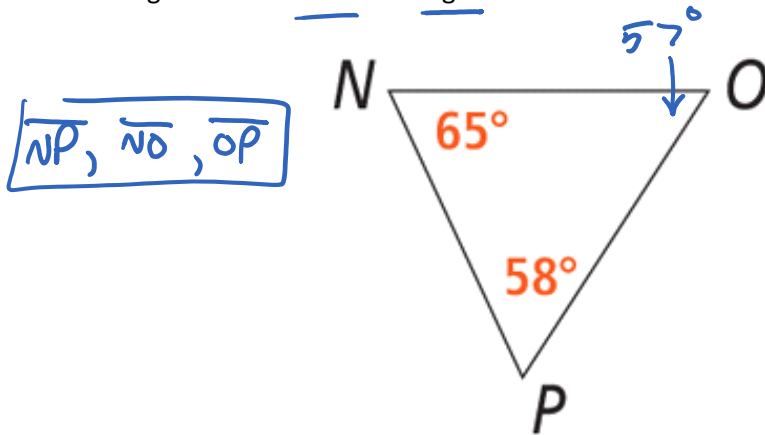Based on the diagram of the triangular garden box, which angle is the largest? Which angle is the smallest?
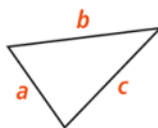
8 in.

D

14 in.

F

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Which side of ΔKLM is the longest?

68°

K

50°

L

$\overline{LM}$ is longest

62°

M

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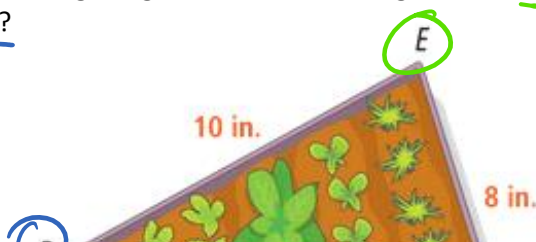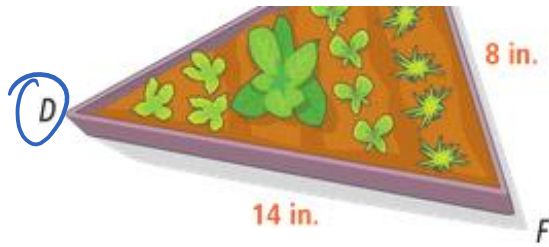
List the side lengths from shortest to longest.

57°

$\overline{NP}, \overline{NO}, \overline{OP}$

N

65°

O

58°

P

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The sum of the lengths of any two sides of a triangle is greater than the length of the third side.
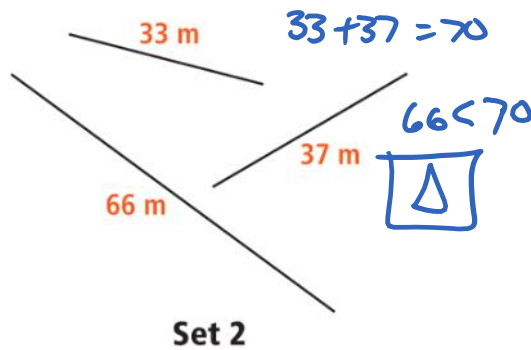
PROOF: SEE EXERCISE 14.

If...

b

a

c

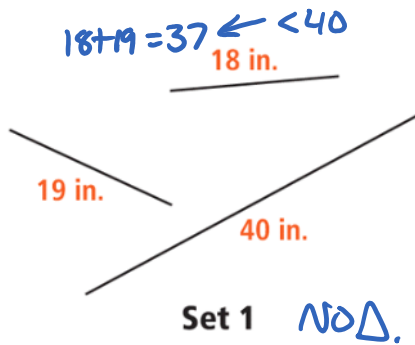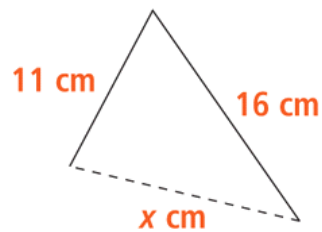Then... $a + b > c$

$a + c > b$

$b + c > a$

Which of the following sets of segments could be the sides of a triangle?

$18+19 = 37$ ← $<40$

18 in.

33 m     $33+37 = 70$

$66<70$

37 m

19 in.

40 in.

66 m

**Set 1** NOΔ.

**Set 2**

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What is the range for the values of x in the following triangle?

$16-11$     $16+11$

$\boxed{5 < x < 27}$

11 cm

16 cm

x cm

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★ Could a triangle have a side length 16m, 39m, and 28m?

★ A triangle has side lengths of 30 in. and 50 in. What are the possible lengths of the third side?

$50-30$     $50+30$

★ $\boxed{20 < x < 80}$

★ $39-16$     $39+16$

$23 < x < 55$

$28$ ✓

$\boxed{\triangle}$

# Homework

Pg. 231
13, 16, 18-29, 35