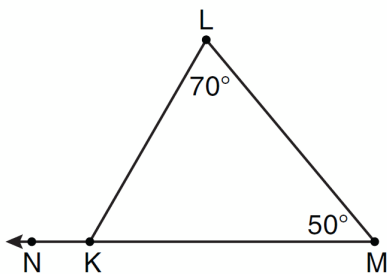
Station A: Exterior Angles
There are two supplementary angles at each vertex: the interior angle and the exterior angle.

1. In the diagram of △*KLM below, m∠L = 70, m∠M = 50 and* $\overline{MK}$ *is extended through N.*

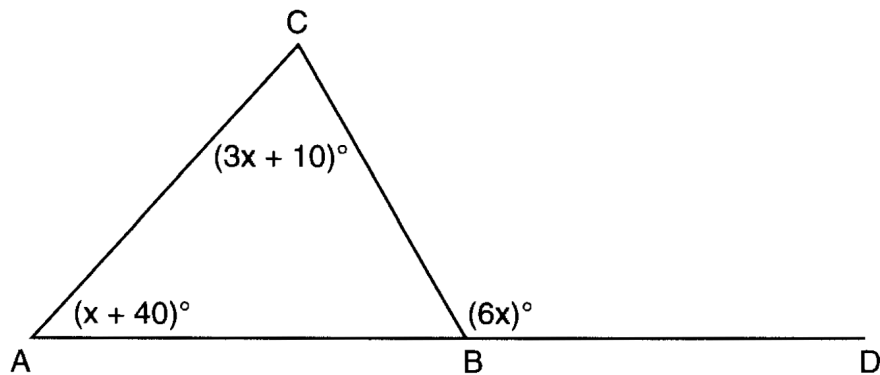   What is the measure of ∠*LKN?*

   (1) 60°   (2) 120°   (3) 180°   (4) 300°

2. In $\triangle FGH$, $m\angle F = 42$and an exterior angle at vertex H has a measure of 104. What is $m\angle G$?

   (1) 34   (2) 62   (3) 76   (4) 146

3. In the diagram below of $\triangle ABC$. side $\overline{BC}$ is extended to point D, $m\angle A = x$, $m\angle B = 2x + 15$, and $\angle ACD = 5x + 5$.
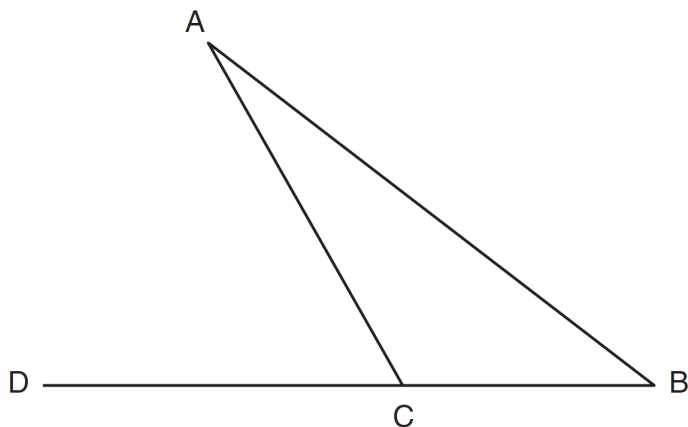
   What is m∠*B?*

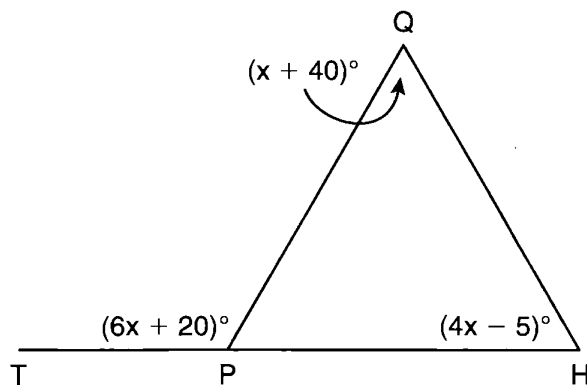   (1) 5   (2) 20   (3) 25   (4) 55

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4. In the diagram of $\triangle ABC$ below, $\overline{AB}$ is extended to point D.

If m$\angle CAB = x + 40$, m$\angle ACB = 3x + 10$, and m$\angle CBD = 6x$, what is m$\angle CAB$?

(1) 13   (2) 25   (3) 53   (4) 65

5. In the diagram below of $\triangle HQP$, side $\overline{HP}$ is extended through P to T, $\angle QPT = 6x + 20$, $\angle HQP = x + 40$, and $\angle PHQ = 4x - 5$. Find m$\angle QPT$

(Not drawn to scale)

Station B: Congruent Triangles

6. Which statement is *not* always true when $\triangle ABC \cong \triangle XYZ$?

   (1) $\overline{BC} \cong \overline{YZ}$ (2) $\overline{CA} \cong \overline{XY}$

   (3) $\angle CAB \cong \angle ZXY$ (4) $\angle BCA \cong \angle YZX$

7. Which of the following does not justify that two triangles are congruent?

   (1) SAS (2) SSA (3) ASA (4) HL

8. If $\triangle ABC \cong \triangle JKL \cong \triangle RST$, then $\overline{BC}$ must be congruent to

   (1) $\overline{JL}$ (2) $\overline{JK}$ (3) $\overline{ST}$ (4) $\overline{RS}$

9. Two right triangles must be congruent if

   (1) an acute angle in each triangle is congruent
   (2) the lengths of the hypotenuses are equal
   (3) the corresponding legs are congruent
   (4) the areas are equal

10. In the diagram below of $\triangle DAE$ and $\triangle BCE$, $\overline{AB}$ and $\overline{CD}$ intersect at *E*, such that $\overline{AE} \cong \overline{CE}$ and $\angle BCE \cong \angle DAE$.
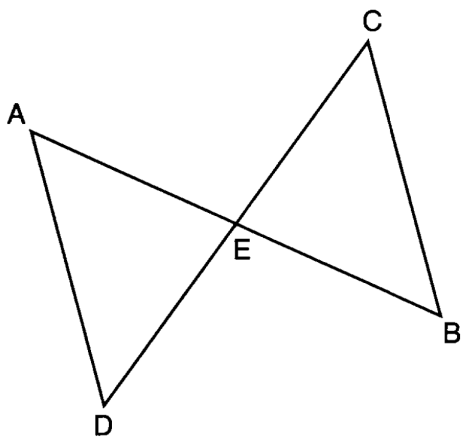
   Triangle *DAE* can be proved congruent to triangle *BCE* by
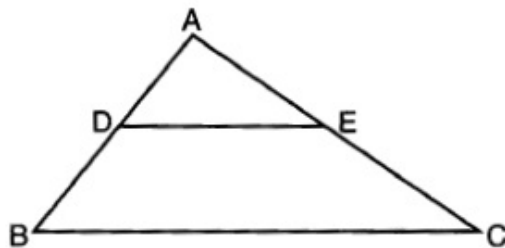
   (1) ASA (2) SAS (3) SSS (4) HL

11. Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?
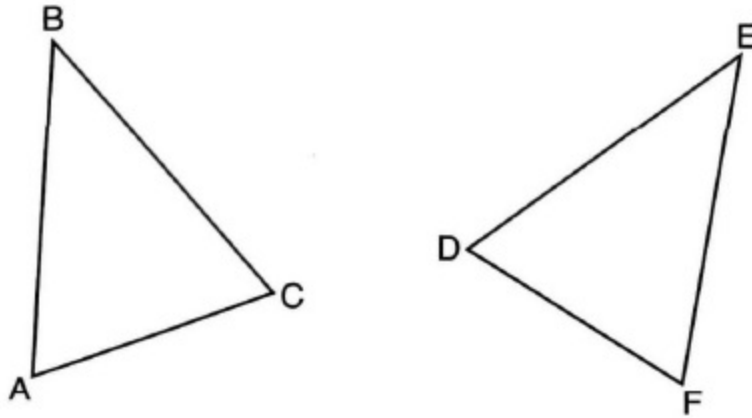
(1) $AB = DE$ and $BC = EF$

(2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$

(3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.

(4) There is a sequence of rigid motions that maps point A onto point D, $\overline{AB}$ onto $\overline{DE}$, and $\angle B$ onto $\angle E$.

Station C: Similar Triangles

12. In the diagram below, $\triangle ABC \sim \triangle ADE$

   Which measurements are justified by this similarity?

   (1) $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
   (2) $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
   (3) $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
   (4) $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

13. In the diagram below of $\triangle ABC$, $\overline{DE}$ is a midsegment of $\triangle ABC$, $DE = 7$, $AB = 10$, and $BC = 13$. Find the perimeter of $\triangle ABC$.
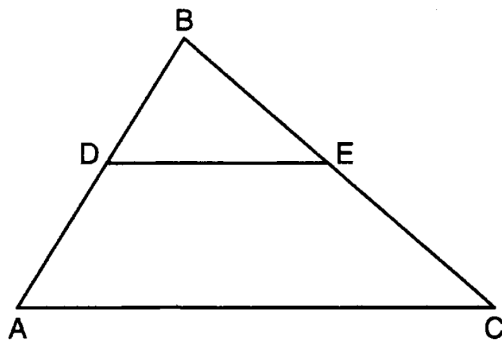
14. If $\triangle RST \sim \triangle ABC$, m$\angle A = 8x - 25$, m$\angle C = 4x + 8$, and m$\angle R = 3x + 40$, find m$\angle C$

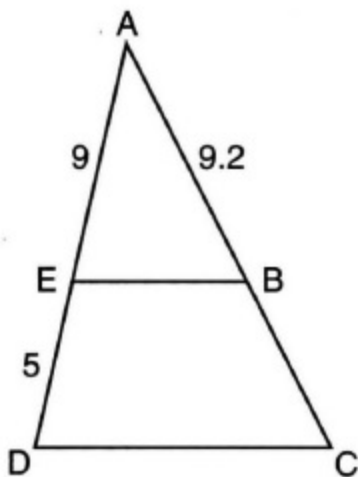   (1) 55   (2) 50   (3) 60   (4) 65

15. In the accompanying diagram, $\overline{AC} \parallel \overline{DE}$, $AB = 10$, $BC = 15$, and $BD = 8$.
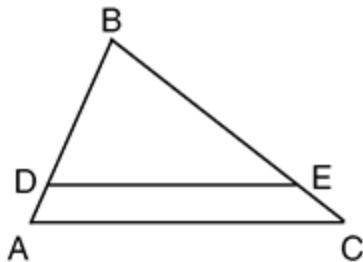
What is the length of $\overline{EC}$?

(1) $5\frac{1}{3}$ (2) 2   (3) 3   (4) 12

16. In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.
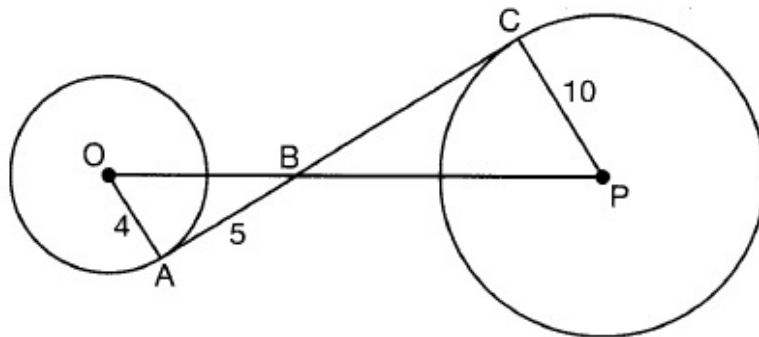

What is the length of $\overline{AC}$, to the *nearest tenth*?

(1) 5.1   (2) 5.2   (3) 14.3   (4) 14.4

17. When $\triangle ABC$ is dilated by a scale factor of 2, its image is $\triangle A'B'C'$. Which statement is true?

(1) $\overline{AC} \cong \overline{A'C'}$
(2) $\angle A \cong \angle A'$
(3) perimeter of $\triangle ABC$ = perimeter of $\triangle A'B'C'$
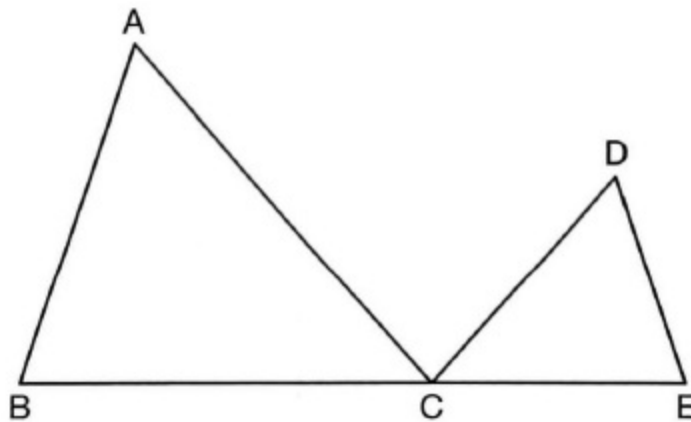(4) 2(area of $\triangle ABC$) = area of $\triangle A'B'C'$

18. In the diagram shown below, $\overline{AC}$ is tangent to circle O at A and to circle P at C, $\overline{OP}$ intersects $\overline{AC}$ at B, $OA = 4$, $AB = 5$, and $PC = 10$.

What is the length of $\overline{BC}$?

(1) 6.4   (2) 8   (3) 12.5   (4) 16

19. In the diagram below, $\triangle ABC \sim \triangle DEC$.

If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?

(1) 12.5   (2) 14.0   (3) 14.8   (4) 17.5