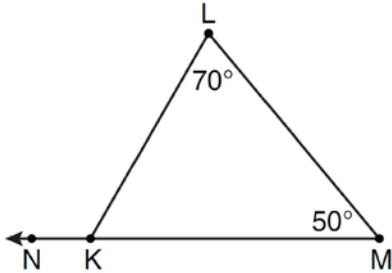


**G.CO.C.10: Exterior Angle Theorem 1**

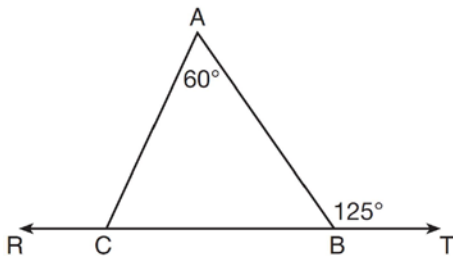
- 1 In the diagram of  $\triangle KLM$  below,  $m\angle L = 70$ ,  $m\angle M = 50$ , and  $\overline{MK}$  is extended through  $N$ .



What is the measure of  $\angle LKN$ ?

- 1)  $60^\circ$
- 2)  $120^\circ$
- 3)  $180^\circ$
- 4)  $300^\circ$

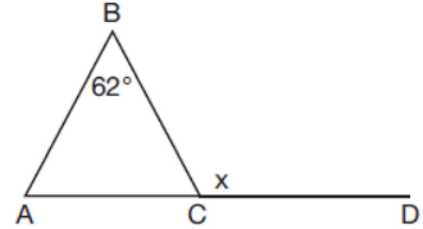
- 2 In the diagram below,  $\overleftrightarrow{RCBT}$  and  $\triangle ABC$  are shown with  $m\angle A = 60$  and  $m\angle ABT = 125$ .



What is  $m\angle ACR$ ?

- 1) 125
- 2) 115
- 3) 65
- 4) 55

- 3 Given  $\triangle ABC$  with  $m\angle B = 62^\circ$  and side  $\overline{AC}$  extended to  $D$ , as shown below.



Which value of  $x$  makes  $\overline{AB} \cong \overline{CB}$ ?

- 1)  $59^\circ$
- 2)  $62^\circ$
- 3)  $118^\circ$
- 4)  $121^\circ$

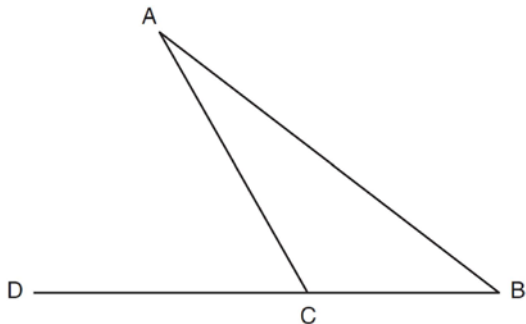
- 4 The measure of one of the base angles of an isosceles triangle is  $42^\circ$ . The measure of an exterior angle at the vertex of the triangle is

- 1)  $42^\circ$
- 2)  $84^\circ$
- 3)  $96^\circ$
- 4)  $138^\circ$

- 5 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

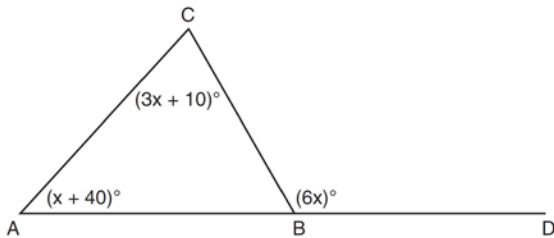
- 6 In the diagram below of  $\triangle ABC$ , side  $\overline{BC}$  is extended to point  $D$ ,  $m\angle A = x$ ,  $m\angle B = 2x + 15$ , and  $m\angle ACD = 5x + 5$ .



What is  $m\angle B$ ?

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

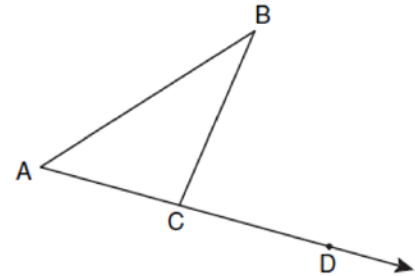
- 7 In the diagram of  $\triangle ABC$  below,  $\overline{AB}$  is extended to point  $D$ .



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

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

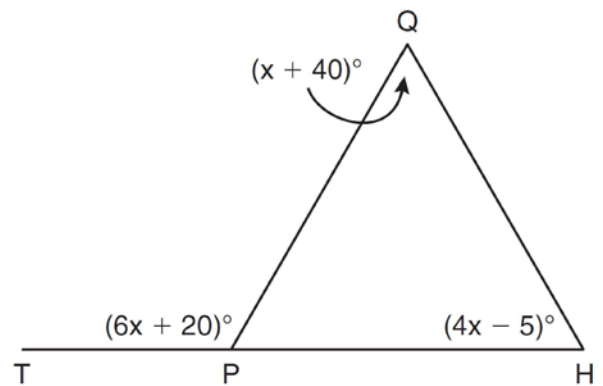
- 8 In the diagram below,  $\triangle ABC$  is shown with  $\overline{AC}$  extended through point  $D$ .



If  $m\angle BCD = 6x + 2$ ,  $m\angle BAC = 3x + 15$ , and  $m\angle ABC = 2x - 1$ , what is the value of  $x$ ?

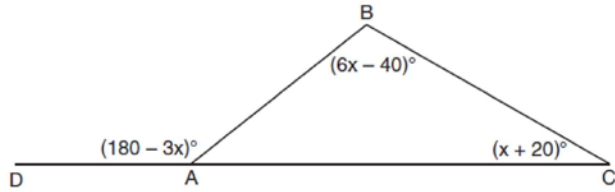
- 1) 12
- 2)  $14\frac{10}{11}$
- 3) 16
- 4)  $18\frac{1}{9}$

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



(Not drawn to scale)

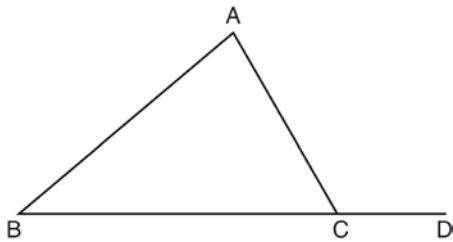
- 10 In  $\triangle ABC$  shown below, side  $\overline{AC}$  is extended to point  $D$  with  $m\angle DAB = (180 - 3x)^\circ$ ,  $m\angle B = (6x - 40)^\circ$ , and  $m\angle C = (x + 20)^\circ$ .



What is  $m\angle BAC$ ?

- 1)  $20^\circ$
- 2)  $40^\circ$
- 3)  $60^\circ$
- 4)  $80^\circ$

- 11 In the diagram below of  $\triangle ABC$ ,  $\overline{BC}$  is extended to  $D$ .

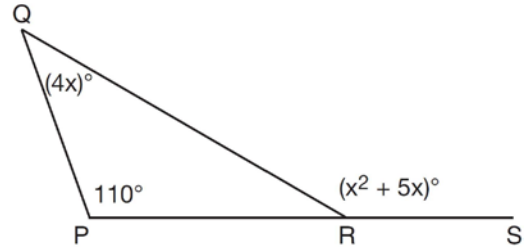


(Not drawn to scale)

If  $m\angle A = x^2 - 6x$ ,  $m\angle B = 2x - 3$ , and  $m\angle ACD = 9x + 27$ , what is the value of  $x$ ?

- 1) 10
- 2) 2
- 3) 3
- 4) 15

- 12 In the diagram of  $\triangle PQR$  shown below,  $\overline{PR}$  is extended to  $S$ ,  $m\angle P = 110$ ,  $m\angle Q = 4x$ , and  $m\angle QRS = x^2 + 5x$ .



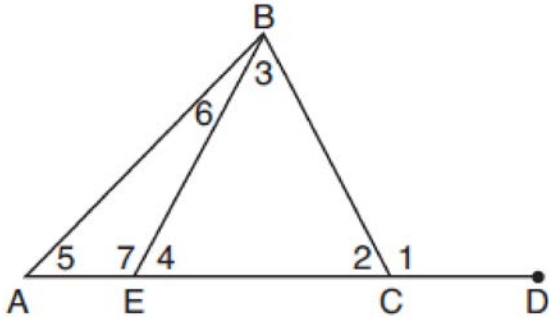
What is  $m\angle Q$ ?

- 1) 44
- 2) 40
- 3) 11
- 4) 10

- 13 In  $\triangle ABC$ ,  $m\angle CAB = 2x$  and  $m\angle ACB = x + 30$ . If  $\overline{AB}$  is extended through point  $B$  to point  $D$ ,  $m\angle CBD = 5x - 50$ . What is the value of  $x$ ?

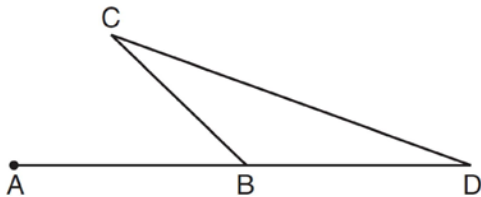
- 1) 25
- 2) 30
- 3) 40
- 4) 46

- 14 In the diagram below of triangle  $ABC$ ,  $\overline{AC}$  is extended through point  $C$  to point  $D$ , and  $\overline{BE}$  is drawn to  $\overline{AC}$ .



Which equation is always true?

- 1)  $m\angle 1 = m\angle 3 + m\angle 2$
  - 2)  $m\angle 5 = m\angle 3 - m\angle 2$
  - 3)  $m\angle 6 = m\angle 3 - m\angle 2$
  - 4)  $m\angle 7 = m\angle 3 + m\angle 2$
- 15 In the diagram below of  $\triangle BCD$ , side  $\overline{DB}$  is extended to point  $A$ .



Which statement must be true?

- 1)  $m\angle C > m\angle D$
- 2)  $m\angle ABC < m\angle D$
- 3)  $m\angle ABC > m\angle C$
- 4)  $m\angle ABC > m\angle C + m\angle D$

- 16 Side  $\overline{PQ}$  of  $\triangle PQR$  is extended through  $Q$  to point  $T$ . Which statement is *not* always true?

- 1)  $m\angle RQT > m\angle R$
- 2)  $m\angle RQT > m\angle P$
- 3)  $m\angle RQT = m\angle P + m\angle R$
- 4)  $m\angle RQT > m\angle PQR$

- 17 In  $\triangle ABC$ , an exterior angle at  $C$  measures  $50^\circ$ . If  $m\angle A > 30$ , which inequality must be true?

- 1)  $m\angle B < 20$
- 2)  $m\angle B > 20$
- 3)  $m\angle BCA < 130$
- 4)  $m\angle BCA > 130$

- 18 In all isosceles triangles, the exterior angle of a base angle must always be

- 1) a right angle
- 2) an acute angle
- 3) an obtuse angle
- 4) equal to the vertex angle

- 19 If one exterior angle of a triangle is acute, then the triangle must be

- 1) right
- 2) acute
- 3) obtuse
- 4) equiangular

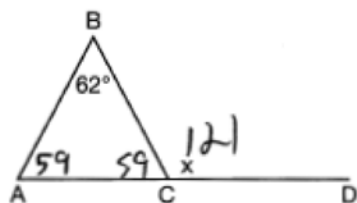
### G.CO.C.10: Exterior Angle Theorem 1

#### Answer Section

- 1 ANS: 2 REF: 061107ge  
 2 ANS: 2  
 $m\angle ABC = 55$ , so  $m\angle ACR = 60 + 55 = 115$

REF: 011414ge

- 3 ANS: 4



REF: 081711geo

- 4 ANS: 2
- 
- $180 - (180 - 42 - 42)$

REF: 062317geo

- 5 ANS: 2 REF: 011206ge

- 6 ANS: 3
- 
- $x + 2x + 15 = 5x + 15$
- $2(5) + 15 = 25$

$$3x + 15 = 5x + 5$$

$$10 = 2x$$

$$5 = x$$

REF: 011127ge

- 7 ANS: 4
- 
- $6x = x + 40 + 3x + 10$
- .
- $m\angle CAB = 25 + 40 = 65$

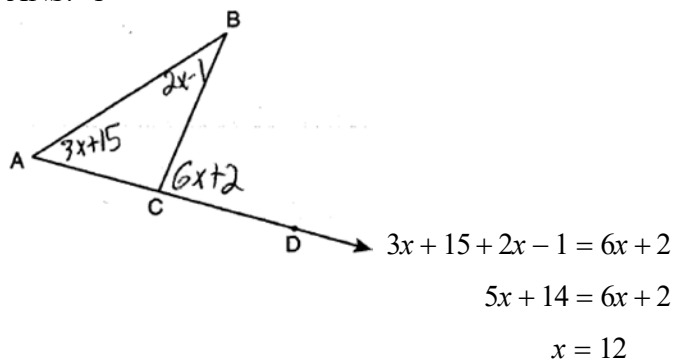
$$6x = 4x + 50$$

$$2x = 50$$

$$x = 25$$

REF: 081310ge

8 ANS: 1



REF: 011021ge

9 ANS:

110.  $6x + 20 = x + 40 + 4x - 5$

$6x + 20 = 5x + 35$

$x = 15$

$6((15) + 20) = 110$

REF: 081031ge

10 ANS: 3

$6x - 40 + x + 20 = 180 - 3x \quad m\angle BAC = 180 - (80 + 40) = 60$

$10x = 200$

$x = 20$

REF: 011809geo

11 ANS: 4

$x^2 - 6x + 2x - 3 = 9x + 27$

$x^2 - 4x - 3 = 9x + 27$

$x^2 - 13x - 30 = 0$

$(x - 15)(x + 2) = 0$

$x = 15, -2$

REF: 061225ge

12 ANS: 2

$x^2 + 5x = 4x + 110 \quad m\angle Q = 4(10) = 40$

$x^2 + x - 110 = 0$

$(x + 11)(x - 10) = 0$

$10 = x$

REF: 061425ge

13 ANS: 3

$$2x + x + 30 = 5x - 50$$

$$80 = 2x$$

$$x = 40$$

REF: 011615ge

14 ANS: 4 REF: 011916geo

15 ANS: 3 REF: 081111ge

16 ANS: 4

(4) is not true if  $\angle PQR$  is obtuse.

REF: 060924ge

17 ANS: 1

$$m\angle A + m\angle B = 50$$

$$30.1 + m\angle B = 50$$

$$m\angle B = 19.9$$

REF: 081424ge

18 ANS: 3 REF: 061508ge

19 ANS: 3 REF: 062215geo