Regents Exam Questions
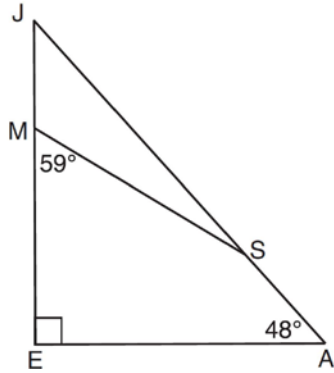G.CO.C.10: Interior and Exterior Angles of Triangles 2
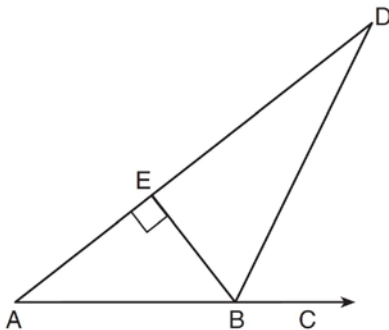www.jmap.org

Name: _____

G.CO.C.10: Interior and Exterior Angles of Triangles 2

1   In the diagram of $\triangle JEA$ below, m$\angle JEA = 90$ and m$\angle EAJ = 48$. Line segment MS connects points M and S on the triangle, such that m$\angle EMS = 59$.

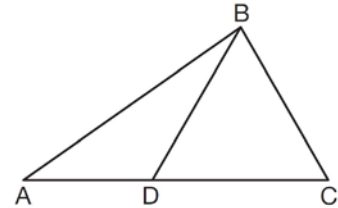

What is m$\angle JSM$?
1)   163
2)   121
3)   42
4)   17

2   The diagram below shows $\triangle ABD$, with $\overrightarrow{ABC}$, $\overline{BE} \perp \overline{AD}$, and $\angle EBD \cong \angle CBD$.

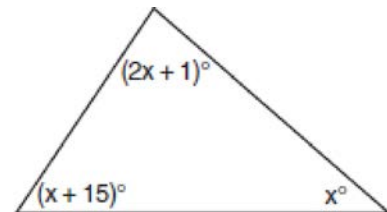If m$\angle ABE = 52$, what is m$\angle D$?
1)   26
2)   38
3)   52
4)   64

3   In the diagram of $\triangle ABC$ below, $\overline{BD}$ is drawn to side $\overline{AC}$.

If m$\angle A = 35$, m$\angle ABD = 25$, and m$\angle C = 60$, which type of triangle is $\triangle BCD$?
1)   equilateral
2)   scalene
3)   obtuse
4)   right

4   What is the measure of the largest angle in the accompanying triangle?

1)   41
2)   46.5
3)   56
4)   83

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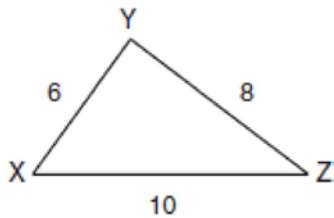5   In which of the accompanying figures are segments *XY* and *YZ* perpendicular?

Figure 1

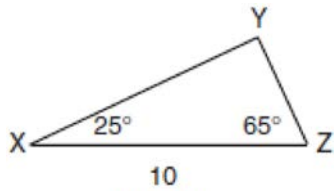

Figure 2

1)   figure 1, only
2)   figure 2, only
3)   both figure 1 and figure 2
4)   neither figure 1 nor figure 2

6   Juliann plans on drawing $\triangle ABC$, where the measure of $\angle A$ can range from 50° to 60° and the measure of $\angle B$ can range from 90° to 100°. Given these conditions, what is the correct range of measures possible for $\angle C$?
1)   20° to 40°
2)   30° to 50°
3)   80° to 90°
4)   120° to 130°

7   In $\triangle ABC$, $m\angle A = x$, $m\angle B = 2x + 2$, and $m\angle C = 3x + 4$. What is the value of x?
1)   29
2)   31
3)   59
4)   61

8   The angles of triangle *ABC* are in the ratio of 8:3:4. What is the measure of the *smallest* angle?
1)   12°
2)   24°
3)   36°
4)   72°

9   The measures of the angles of a triangle are in the ratio 2:3:4. In degrees, the measure of the *largest* angle of the triangle is
1)   20
2)   40
3)   80
4)   100

10   In $\triangle DEF$, $m\angle D = 3x + 5$, $m\angle E = 4x - 15$, and $m\angle F = 2x + 10$. Which statement is true?
1) $DF = FE$
2) $DE = FE$
3) $m\angle E = m\angle F$
4) $m\angle D = m\angle F$

11   In $\triangle ABC$, $m\angle A = 3x + 1$, $m\angle B = 4x - 17$, and $m\angle C = 5x - 20$. Which type of triangle is $\triangle ABC$?
1)   right
2)   scalene
3)   isosceles
4)   equilateral

12   In right triangle *ABC*, $m\angle C = 3y - 10$, $m\angle B = y + 40$, and $m\angle A = 90$. What type of right triangle is triangle *ABC*?
1)   scalene
2)   isosceles
3)   equilateral
4)   obtuse

2

Regents Exam Questions
Name: _____
G.CO.C.10: Interior and Exterior Angles of Triangles 2
www.jmap.org

13 If the measures of the angles of a triangle are represented by $2x$, $3x - 15$, and $7x + 15$, the triangle is
    1) an isosceles triangle
    2) a right triangle
   3) an acute triangle
    4) an equiangular triangle

14 If the measures, in degrees, of the three angles of a triangle are x, $x + 10$, and $2x - 6$, the triangle must be
    1) isosceles
    2) equilateral
    3) right
    4) scalene

15 Triangle PQR has angles in the ratio of $2:3:5$. Which type of triangle is $\triangle PQR$?
    1) acute
    2) isosceles
    3) obtuse
    4) right

16 Which phrase does *not* describe a triangle?
    1) acute scalene
    2) isosceles right
    3) equilateral equiangular
    4) obtuse right

17 In an equilateral triangle, what is the difference between the sum of the exterior angles and the sum of the interior angles?
    1) 180°
    2) 120°
    3) 90°
    4) 60°

18 A billboard on level ground is supported by a brace, as shown in the accompanying diagram. The measure of angle A is 15° greater than twice the measure of angle B. Determine the measure of angle A and the measure of angle B.
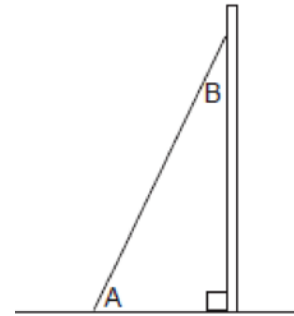
19 The degree measures of the angles of $\triangle ABC$ are represented by x, $3x$, and $5x - 54$. Find the value of x.

20 In right $\triangle DEF$, m$\angle D = 90$ and m$\angle F$ is 12 degrees less than twice m$\angle E$. Find m$\angle E$.

21 In $\triangle ABC$, the measure of angle A is fifteen less than twice the measure of angle B. The measure of angle C equals the sum of the measures of angle A and angle B. Determine the measure of angle B.

22 In $\triangle ABC$, the measure of $\angle B$ is 21 less than four times the measure of $\angle A$, and the measure of $\angle C$ is 1 more than five times the measure of $\angle A$. Find the measure, in degrees, of each angle of $\triangle ABC$.

23 The measures of the angles of a triangle are in the ratio $5:6:7$. Determine the measure, in degrees, of the *smallest* angle of the triangle.

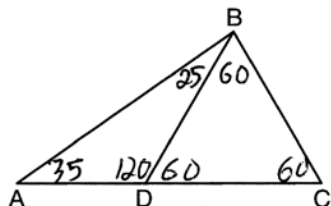## G.CO.C.10: Interior and Exterior Angles of Triangles 2
Answer Section

1 ANS: 4   REF: 081206ge

2 ANS: 1

$$\frac{180 - 52}{2} = 64. \quad 180 - (90 + 64) = 26$$

   REF: 011314ge

3 ANS: 1

   REF: 011504ge

4 ANS: 4

$$(2x + 1) + (x + 15) + x = 180$$
$$4x + 16 = 180 \quad 2(41) + 1 = 83°$$
$$4x = 164 \quad 41 + 15 = 56°$$
$$x = 41$$

   REF: 080216a

5 ANS: 3

Because the sides of the triangle in Figure 1 are 6, 8 and 10, which is a multiple of a Pythagorean triple, the triangle is a right triangle. The side with a length of 10 is longest and is the hypotenuse. Angle Y is a right angle because it is opposite the hypotenuse. Therefore segments XY and YZ are perpendicular in Figure 1. In Figure 2, the sum of the two angles equals 90°, so the third angle, Y, must equal 90°. Therefore segments XY and YZ are perpendicular in Figure 2.

   REF: 010119a

6 ANS: 1

If $\angle A$ is at minimum (50°) and $\angle B$ is at minimum (90°), $\angle C$ is at maximum of 40° (180° - (50° + 90°)). If $\angle A$ is at maximum (60°) and $\angle B$ is at maximum (100°), $\angle C$ is at minimum of 20° (180° - (60° + 100°)).

   REF: 060901ge

7 ANS: 1

$$x + 2x + 2 + 3x + 4 = 180$$
$$6x + 6 = 180$$
$$x = 29$$

   REF: 011002ge

8   ANS: 3

$$\frac{3}{8+3+4} \times 180 = 36$$

   REF: 011210ge
9   ANS: 3

$$\frac{4}{2+3+4} \times 180 = 80$$

   REF: 061404ge
10 ANS: 1

$3x + 5 + 4x - 15 + 2x + 10 = 180.$ $m\angle D = 3(20) + 5 = 65.$ $m\angle E = 4(20) - 15 = 65.$

$$9x = 180$$
$$x = 20$$

   REF: 061119ge
11 ANS: 3

$3x + 1 + 4x - 17 + 5x - 20 = 180.$ $3(18) + 1 = 55$

$$12x - 36 = 180 \quad 4(18) - 17 = 55$$
$$12x = 216 \quad 5(18) - 20 = 70$$
$$x = 18$$

   REF: 061308ge
12 ANS: 1

$$3y - 10 + y + 40 + 90 = 180 \qquad C = 3(15) - 10 = 35$$
$$4y + 120 = 180 \qquad B = (15) + 40 = 55$$
$$4y = 60 \qquad A = 90$$
$$y = 15$$

   REF: 010102a
13 ANS: 1

$$2x + 3x - 15 + 7x + 15 = 180 \qquad 2(15) = 30$$
$$12x = 180 \quad 3(15) - 15 = 30$$
$$x = 15 \quad 7(15) + 15 = 120$$

   REF: 010722a
14 ANS: 4

$$x + x + 10 + 2x - 6 = 180$$
$$4x + 4 = 180 \qquad x = 44$$
$$4x = 176 \qquad (44) + 10 = 54$$
$$x = 44 \qquad 2(44) - 6 = 82$$

   REF: 010810a

15 ANS: 4

$$\frac{5}{2+3+5} \times 180 = 90$$

REF: 081119ge

16 ANS: 4

If a triangle has a right angle, neither of the other angles can be obtuse.

REF: 060417a

17 ANS: 1

In an equilateral triangle, each interior angle is 60° and each exterior angle is 120° (180° - 120°). The sum of the three interior angles is 180° and the sum of the three exterior angles is 360°.

REF: 060909ge

18 ANS:

$\mathrm{m}\angle A = 65$ and $\mathrm{m}\angle B = 25$.

$$\begin{aligned} A + B + C &= 180 \\ (2B + 15) + B + 90 &= 180 \\ 3B &= 75 \\ B &= 25 \end{aligned}$$

$$\begin{aligned} A + B + C &= 180 \\ A + 25 + 90 &= 180 \\ A &= 65 \end{aligned}$$

REF: 080837a

19 ANS:

26.
$$\begin{aligned} x + 3x + 5x - 54 &= 180 \\ 9x &= 234 \\ x &= 26 \end{aligned}$$

REF: 080933ge

20 ANS:

34.
$$\begin{aligned} 2x - 12 + x + 90 &= 180 \\ 3x + 78 &= 90 \\ 3x &= 102 \\ x &= 34 \end{aligned}$$

REF: 061031ge

21 ANS:

$$A = 2B - 15$$
$$C = A + B$$
$$C = 2B - 15 + B$$

$$\begin{aligned} 2B - 15 + B + 2B - 15 + B &= 180 \\ 6B - 30 &= 180 \\ 6B &= 210 \\ B &= 35 \end{aligned}$$

REF: 081332ge

22 ANS:

$$m\angle A = x \qquad x + (4x - 21) + (5x + 1) = 180$$

m$\angle A$ = 20, m$\angle B$ = 59, m$\angle C$ = 101. $\quad$ m$\angle B = 4x - 21.$ $\qquad\qquad 10x - 20 = 180$.

$$m\angle C = 5x + 1 \qquad\qquad x = 20$$

m$\angle A = x = 20°$

m$\angle B = 4(20) - 21 = 59°$

m$\angle C = 5(20) + 1 = 101°$

REF: 010538a

23 ANS:

$$\frac{5}{5 + 6 + 7} \cdot 180 = 50$$

REF: 061529ge