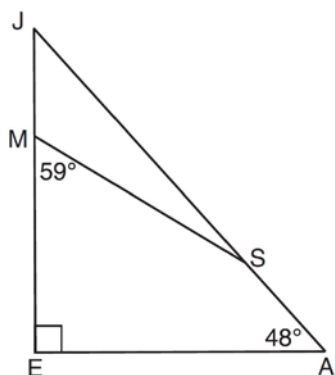


**G.G.30: Interior and Exterior Angles of Triangles 1: Investigate, justify, and apply theorems about the sum of the measures of the angles of a triangle**

- 1 In an equilateral triangle, what is the difference between the sum of the exterior angles and the sum of the interior angles?
- 1)  $180^\circ$
  - 2)  $120^\circ$
  - 3)  $90^\circ$
  - 4)  $60^\circ$

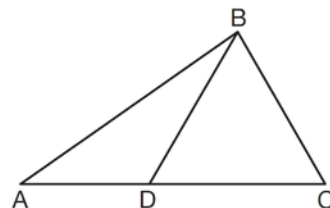
- 2 In the diagram of  $\triangle JEA$  below,  $m\angle JEA = 90$  and  $m\angle EAJ = 48$ . Line segment  $MS$  connects points  $M$  and  $S$  on the triangle, such that  $m\angle EMS = 59$ .



What is  $m\angle JSM$ ?

- 1) 163
- 2) 121
- 3) 42
- 4) 17

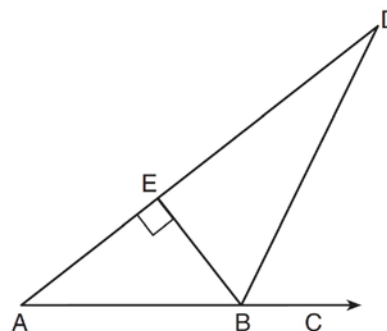
- 3 In the diagram of  $\triangle ABC$  below,  $\overline{BD}$  is drawn to side  $\overline{AC}$ .



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



If  $m\angle ABE = 52$ , what is  $m\angle D$ ?

- 1) 26
- 2) 38
- 3) 52
- 4) 64

- 5 The angles of triangle  $ABC$  are in the ratio of  $8:3:4$ . What is the measure of the *smallest* angle?
  - 1)  $12^\circ$
  - 2)  $24^\circ$
  - 3)  $36^\circ$
  - 4)  $72^\circ$
- 6 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
- 7 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
- 8 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
- 9 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
- 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 Juliann plans on drawing  $\triangle ABC$ , where the measure of  $\angle A$  can range from  $50^\circ$  to  $60^\circ$  and the measure of  $\angle B$  can range from  $90^\circ$  to  $100^\circ$ . Given these conditions, what is the correct range of measures possible for  $\angle C$ ?
  - 1)  $20^\circ$  to  $40^\circ$
  - 2)  $30^\circ$  to  $50^\circ$
  - 3)  $80^\circ$  to  $90^\circ$
  - 4)  $120^\circ$  to  $130^\circ$
- 12 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.
- 13 The degree measures of the angles of  $\triangle ABC$  are represented by  $x$ ,  $3x$ , and  $5x - 54$ . Find the value of  $x$ .
- 14 In right  $\triangle DEF$ ,  $m\angle D = 90$  and  $m\angle F$  is 12 degrees less than twice  $m\angle E$ . Find  $m\angle E$ .
- 15 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  $B$ .

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**Answer Section**

1 ANS: 1

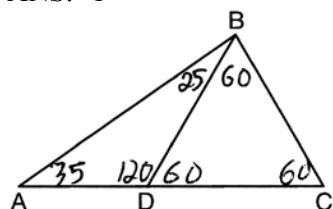
In an equilateral triangle, each interior angle is  $60^\circ$  and each exterior angle is  $120^\circ$  ( $180^\circ - 60^\circ$ ). The sum of the three interior angles is  $180^\circ$  and the sum of the three exterior angles is  $360^\circ$ .

REF: 060909ge

2 ANS: 4

REF: 081206ge

3 ANS: 1



REF: 011504ge

4 ANS: 1

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

REF: 011314ge

5 ANS: 3

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

REF: 011210ge

6 ANS: 3

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

REF: 061404ge

7 ANS: 4

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

REF: 081119ge

8 ANS: 3

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

$$12x - 36 = 180 \quad 4(18) - 17 = 55$$

$$12x = 216 \quad 5(18) - 20 = 70$$

$$x = 18$$

REF: 061308ge

9 ANS: 1

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

$$6x + 6 = 180$$

$$x = 29$$

REF: 011002ge

10 ANS: 1

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

$$9x = 180$$

$$x = 20$$

REF: 061119ge

11 ANS: 1

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

REF: 060901ge

12 ANS:

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

REF: 061529ge

13 ANS:

$$26. \quad x + 3x + 5x - 54 = 180$$

$$9x = 234$$

$$x = 26$$

REF: 080933ge

14 ANS:

$$34. \quad 2x - 12 + x + 90 = 180$$

$$3x + 78 = 90$$

$$3x = 102$$

$$x = 34$$

REF: 061031ge

15 ANS:

$$A = 2B - 15 \quad . \quad 2B - 15 + B + 2B - 15 + B = 180$$

$$C = A + B \quad \quad \quad 6B - 30 = 180$$

$$C = 2B - 15 + B \quad \quad \quad 6B = 210$$

$$B = 35$$

REF: 081332ge