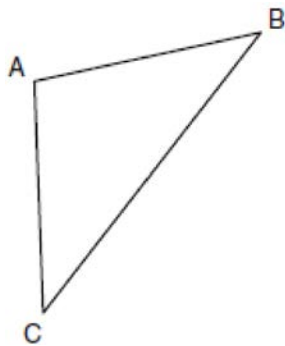


G.G.31: Isosceles Triangle Theorem 1: Investigate, justify, and apply the isosceles triangle theorem and its converse

- 1 If the vertex angles of two isosceles triangles are congruent, then the triangles must be
 - 1) acute
 - 2) congruent
 - 3) right
 - 4) similar

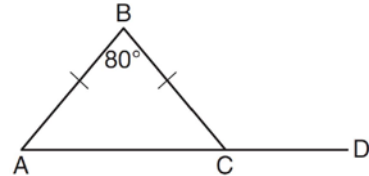
- 2 In the diagram of $\triangle ABC$ below, $\overline{AB} \cong \overline{AC}$. The measure of $\angle B$ is 40° .



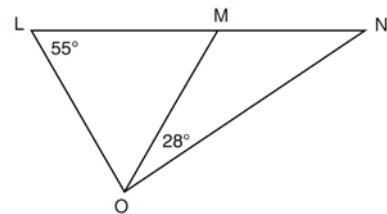
What is the measure of $\angle A$?

- 1) 40°
 - 2) 50°
 - 3) 70°
 - 4) 100°
- 3 In $\triangle JKL$, $\overline{JL} \cong \overline{KL}$. If $m\angle J = 58$, then $m\angle L$ is
 - 1) 61
 - 2) 64
 - 3) 116
 - 4) 122

- 4 In the diagram below of isosceles $\triangle ABC$, the measure of vertex angle B is 80° . If \overline{AC} extends to point D , what is $m\angle BCD$?



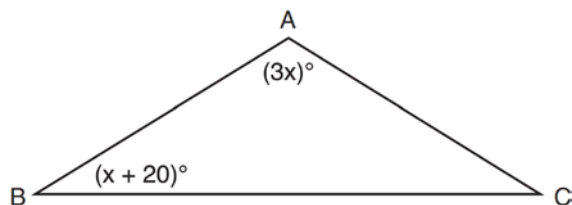
- 1) 50
 - 2) 80
 - 3) 100
 - 4) 130
- 5 In the diagram below, $\triangle LMO$ is isosceles with $LO = MO$.



If $m\angle L = 55$ and $m\angle NOM = 28$, what is $m\angle N$?

- 1) 27
- 2) 28
- 3) 42
- 4) 70

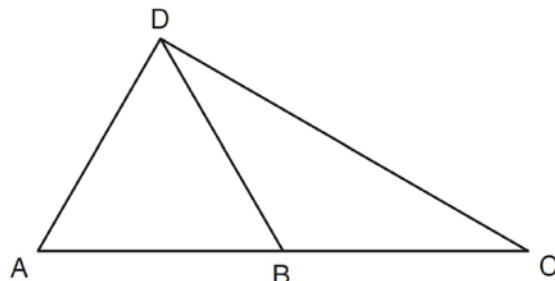
- 6 In the diagram below of $\triangle ABC$, $\overline{AB} \cong \overline{AC}$, $m\angle A = 3x$, and $m\angle B = x + 20$.



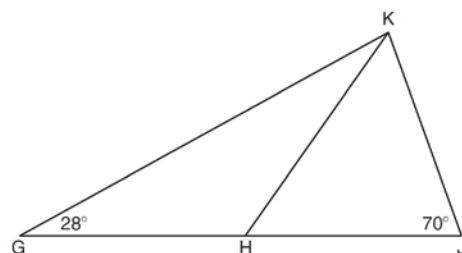
What is the value of x ?

- 1) 10
 - 2) 28
 - 3) 32
 - 4) 40
- 7 The vertex angle of an isosceles triangle measures 15 degrees more than one of its base angles. How many degrees are there in a base angle of the triangle?
- 1) 50
 - 2) 55
 - 3) 65
 - 4) 70
- 8 In $\triangle FGH$, $m\angle F = m\angle H$, $GF = x + 40$, $HF = 3x - 20$, and $GH = 2x + 20$. The length of \overline{GH} is
- 1) 20
 - 2) 40
 - 3) 60
 - 4) 80
- 9 In $\triangle ABC$, $\overline{AB} \cong \overline{BC}$. An altitude is drawn from B to \overline{AC} and intersects \overline{AC} at D . Which conclusion is *not* always true?
- 1) $\angle ABD \cong \angle CBD$
 - 2) $\angle BDA \cong \angle BDC$
 - 3) $\overline{AD} \cong \overline{BD}$
 - 4) $\overline{AD} \cong \overline{DC}$
- 10 In isosceles triangle ABC , $AB = BC$. Which statement will always be true?
- 1) $m\angle B = m\angle A$
 - 2) $m\angle A > m\angle B$
 - 3) $m\angle A = m\angle C$
 - 4) $m\angle C < m\angle B$

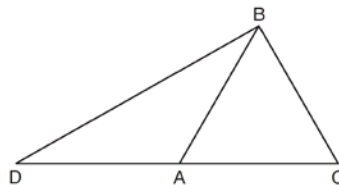
- 11 In the diagram below of $\triangle ACD$, B is a point on \overline{AC} such that $\triangle ADB$ is an equilateral triangle, and $\triangle DBC$ is an isosceles triangle with $\overline{DB} \cong \overline{BC}$. Find $m\angle C$.



- 12 In the diagram below of $\triangle GJK$, H is a point on \overline{GJ} , $\overline{HJ} \cong \overline{JK}$, $m\angle G = 28$, and $m\angle GJK = 70$. Determine whether $\triangle GHK$ is an isosceles triangle and justify your answer.



- 13 In $\triangle RST$, $m\angle RST = 46$ and $\overline{RS} \cong \overline{ST}$. Find $m\angle STR$.
- 14 In the diagram of $\triangle BCD$ shown below, \overline{BA} is drawn from vertex B to point A on \overline{DC} , such that $\overline{BC} \cong \overline{BA}$.



In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.] Find $m\angle D$. Find $m\angle BAC$. Find the length of BC . Find the length of DC .

G.G.31: Isosceles Triangle Theorem 1: Investigate, justify, and apply the isosceles triangle theorem and its converse

Answer Section

1 ANS: 4 REF: 061124ge

2 ANS: 4
 $180 - (40 + 40) = 100$

REF: 080903ge

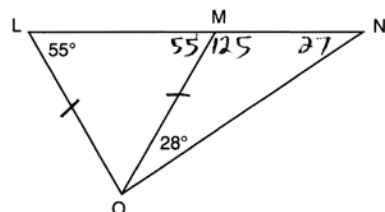
3 ANS: 2
 $180 - 2(58) = 64$

REF: 081510ge

4 ANS: 4
 $180 - \frac{180 - 80}{2} = 130$

REF: 011508ge

5 ANS: 1



REF: 061211ge

6 ANS: 2
 $3x + x + 20 + x + 20 = 180$
 $5x = 40$
 $x = 28$

REF: 081222ge

7 ANS: 2
 $x + x + x + 15 = 180$
 $3x + 15 = 180$
 $3x = 165$
 $x = 15$

REF: 061407ge

