

Answer Key

Section 16-1

1. D 2. C 3. B 4. D

Section 16-2

1. D 2. A 3. B 4. C

Section 16-3

1. A 2. C 3. D 4. B

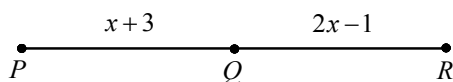
Chapter 16 Practice Test

1. C 2. B 3. A 4. C 5. A
6. D 7. 540 8. 105

Answers and Explanations

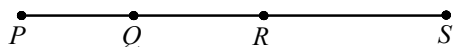
Section 16-1

1. D



$$\begin{aligned}
 PQ &= QR && \text{Definition of Midpoint} \\
 x+3 &= 2x-1 && \text{Substitution} \\
 x+3-x &= 2x-1-x && \text{Subtract } x \text{ from each side.} \\
 3 &= x-1 && \text{Simplify.} \\
 4 &= x \\
 PR &= PQ+QR && \text{Segment Addition Postulate} \\
 &= x+3+2x-1 && \text{Substitution} \\
 &= 3x+2 \\
 &= 3(4)+2 = 14 && x = 4
 \end{aligned}$$

2. C



Note: Figure not drawn to scale.

$$\begin{aligned}
 \text{Let } PS &= x, \text{ then } QR = \frac{1}{3}PS = \frac{1}{3}x. \\
 PR &= PQ+QR && \text{Segment Addition Postulate} \\
 12 &= PQ+\frac{1}{3}x && PR = 12 \text{ and } QR = \frac{1}{3}x \\
 PQ &= 12-\frac{1}{3}x && \text{Solve for } PQ. \\
 QS &= QR+RS && \text{Segment Addition Postulate}
 \end{aligned}$$

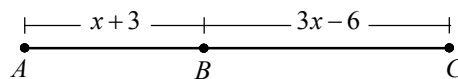
$$\begin{aligned}
 16 &= \frac{1}{3}x+RS && QS = 16 \text{ and } QR = \frac{1}{3}x \\
 RS &= 16-\frac{1}{3}x && \text{Solve for } RS. \\
 PS &= PQ+QR+RS && \text{Segment Addition Postulate} \\
 x &= (12-\frac{1}{3}x)+\frac{1}{3}x+(16-\frac{1}{3}x) && \text{Substitution} \\
 x &= 28-\frac{1}{3}x && \text{Simplify.} \\
 \frac{4}{3}x &= 28 && \text{Add } \frac{1}{3}x \text{ to each side.} \\
 \frac{3}{4} \cdot \frac{4}{3}x &= \frac{3}{4} \cdot 28 && \text{Multiply } \frac{3}{4} \text{ by each side.} \\
 x &= 21
 \end{aligned}$$

Therefore, $PS = x = 21$.

3. B

Ray CA and Ray CD are opposite rays, because points A , C , and D are collinear and C is between A and D .

4. D



Note: Figure not drawn to scale.

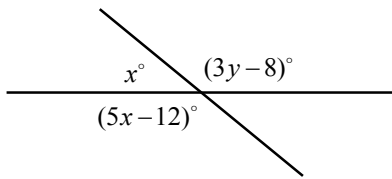
$$\begin{aligned}
 AB &= \frac{2}{3}BC && \text{Given} \\
 x+3 &= \frac{2}{3}(3x-6) && \text{Substitution} \\
 x+3 &= 2x-4 && \text{Simplify.} \\
 7 &= x && \text{Solve for } x. \\
 AC &= AB+BC && \text{Segment Addition Postulate} \\
 &= x+3+3x-6 && \text{Substitution} \\
 &= 4x-3 && \text{Simplify.} \\
 &= 4(7)-3 && x = 7 \\
 &= 25
 \end{aligned}$$

Section 16-2

1. D

$$\begin{aligned}
 40+x-90 &= 180 && \text{Straight } \angle \text{ measures } 180. \\
 x-50 &= 180 && \text{Simplify.} \\
 x-50+50 &= 180+50 && \text{Add } 50 \text{ to each side.} \\
 x &= 230
 \end{aligned}$$

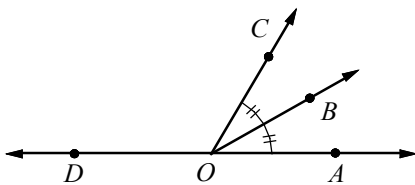
2. A



Note: Figure not drawn to scale.

$$\begin{aligned} x + 5x - 12 &= 180 && \text{Straight } \angle \text{ measures } 180. \\ 6x - 12 &= 180 \\ 6x &= 192 \\ x &= 32 \\ x + 3y - 8 &= 180 && \text{Straight } \angle \text{ measures } 180. \\ 32 + 3y - 8 &= 180 && x = 32 \\ 24 + 3y &= 180 && \text{Simplify.} \\ 24 + 3y - 24 &= 180 - 24 \\ 3y &= 156 \\ y &= 52 \end{aligned}$$

3. B



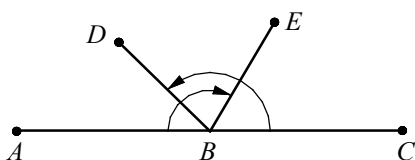
Note: Figure not drawn to scale.

$$\begin{aligned} m\angle BOA &= \frac{1}{2} m\angle COA && \text{Definition of } \angle \text{ bisector} \\ m\angle BOA &= \frac{1}{2} (8x - 12) && \text{Substitution} \\ m\angle BOA &= 4x - 6 && \text{Simplify.} \\ m\angle DOB + m\angle BOA &= 180 && \text{Straight } \angle \text{ measures } 180. \\ 11x + 6 + 4x - 6 &= 180 && \text{Substitution} \\ 15x &= 180 && \text{Simplify.} \\ x &= 12 \end{aligned}$$

$$\text{Thus, } m\angle COA = 8x - 12 = 8(12) - 12 = 84.$$

$$\begin{aligned} m\angle DOC + m\angle COA &= 180 && \text{Straight } \angle \text{ measures } 180. \\ m\angle DOC + 84 &= 180 && m\angle COA = 84 \\ m\angle DOC &= 96 \end{aligned}$$

4. C



Note: Figure not drawn to scale.

$$\text{Let } m\angle DBE = x$$

$$m\angle ABE$$

$$= m\angle ABD + m\angle DBE \quad \text{Angle Addition Postulate}$$

$$120 = m\angle ABD + x \quad \text{Substitution}$$

$$120 - x = m\angle ABD$$

$$m\angle ABD + m\angle CBD = 180 \quad \text{Straight } \angle \text{ measures } 180.$$

$$120 - x + 135 = 180 \quad \text{Substitution}$$

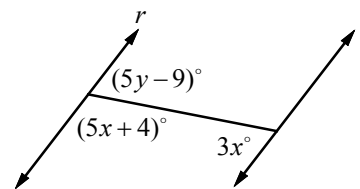
$$255 - x = 180 \quad \text{Simplify.}$$

$$x = 75$$

Therefore, $m\angle DBE = x = 75$.

Section 16-3

1. A



Note: Figure not drawn to scale

$$5x + 4 + 3x = 180 \quad \text{If } r \parallel t, \text{ consecutive interior } \angle \text{s are supplementary.}$$

$$8x + 4 = 180 \quad \text{Simplify.}$$

$$8x = 176$$

$$x = 22$$

$$5x + 4 + 5y - 9 = 180 \quad \text{Straight } \angle \text{ measures } 180.$$

$$5x - 5 + 5y = 180 \quad \text{Simplify.}$$

$$5(22) - 5 + 5y = 180 \quad x = 22$$

$$110 - 5 + 5y = 180 \quad \text{Simplify.}$$

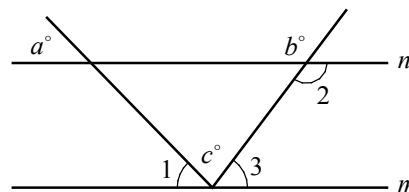
$$105 + 5y = 180 \quad \text{Simplify.}$$

$$5y = 75 \quad \text{Simplify.}$$

$$y = 15$$

Therefore, $x + y = 22 + 15 = 37$.

2. C



$$m\angle 1 = a$$

If $m \parallel n$, corresponding \angle s are \cong .

$$m\angle 1 = 50$$

$$a = 50$$

$$m\angle 2 = b$$

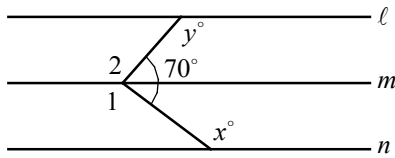
Vertical \angle s are \cong .

$$m\angle 2 = 120$$

$$b = 120$$

$$\begin{aligned}
 m\angle 2 + m\angle 3 &= 180 && \text{If } m \parallel n, \text{ consecutive interior } \\
 &&& \angle s \text{ are supplementary.} \\
 120 + m\angle 3 &= 180 && m\angle 2 = 120 \\
 m\angle 3 &= 60 \\
 m\angle 1 + c + m\angle 3 &= 180 && \text{Straight } \angle \text{ measures } 180. \\
 50 + c + 60 &= 180 && m\angle 1 = 50 \text{ and } m\angle 3 = 60 \\
 c + 110 &= 180 && \text{Simplify.} \\
 c &= 70
 \end{aligned}$$

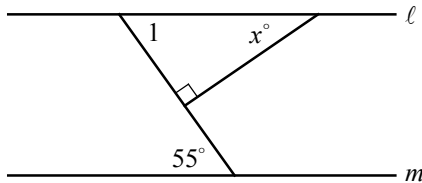
3. D



Note: Figure not drawn to scale.

$$\begin{aligned}
 m\angle 1 &= x && \text{If } m \parallel n, \text{ alternate interior } \\
 &&& \angle s \text{ are } \cong. \\
 m\angle 2 &= y && \text{If } \ell \parallel m, \text{ alternate interior } \\
 &&& \angle s \text{ are } \cong. \\
 m\angle 1 + m\angle 2 + 70 &= 360 && \text{There are } 360^\circ \text{ in a circle.} \\
 x + y + 70 &= 360 && m\angle 1 = x \text{ and } m\angle 2 = y \\
 x + y &= 290
 \end{aligned}$$

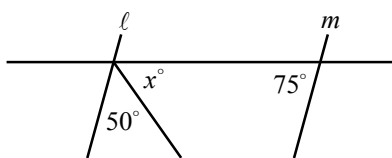
4. B



$$\begin{aligned}
 m\angle 1 &= 55 && \text{If } \ell \parallel m, \text{ alternate interior } \\
 &&& \angle s \text{ are } \cong. \\
 m\angle 1 + x &= 90 && \text{The acute } \angle s \text{ of a right } \\
 &&& \text{triangle are complementary.} \\
 55 + x &= 90 && m\angle 1 = 55 \\
 x &= 35
 \end{aligned}$$

Chapter 16 Practice Test

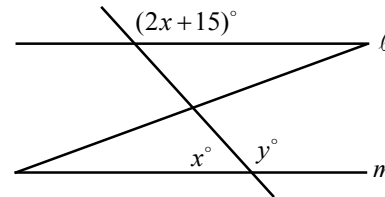
1. C



Note: Figure not drawn to scale.

$$\begin{aligned}
 50 + x + 75 &= 180 && \text{If } \ell \parallel m, \text{ consecutive interior } \\
 &&& \angle s \text{ are supplementary.} \\
 125 + x &= 180 && \text{Simplify.} \\
 x &= 55
 \end{aligned}$$

2. B

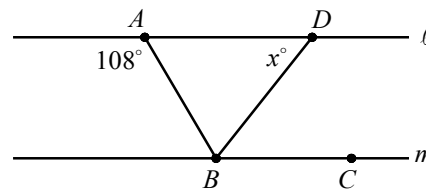


Note: Figure not drawn to scale.

$$\begin{aligned}
 y &= 2x + 15 && \text{If } \ell \parallel m, \text{ consecutive interior } \\
 &&& \angle s \text{ are supplementary.} \\
 x + y &= 180 && \text{Straight } \angle \text{ measures } 180. \\
 x + (2x + 15) &= 180 && y = 2x + 15 \\
 3x + 15 &= 180 && \text{Simplify.} \\
 3x &= 165 \\
 x &= 55
 \end{aligned}$$

Therefore, $y = 2x + 15 = 2(55) + 15 = 125$.

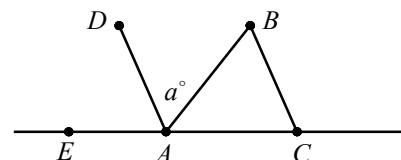
3. A



Note: Figure not drawn to scale.

$$\begin{aligned}
 m\angle ABC &= 108 && \text{If } \ell \parallel m, \text{ alternate interior } \\
 &&& \angle s \text{ are } \cong. \\
 m\angle DBC &= \frac{1}{2}m\angle ABC && \text{Definition of } \angle \text{ bisector} \\
 m\angle DBC &= \frac{1}{2}(108) && m\angle ABC = 108 \\
 m\angle DBC &= 54 && \text{Simplify.} \\
 x &= m\angle DBC && \text{If } \ell \parallel m, \text{ alternate interior } \\
 &&& \angle s \text{ are } \cong. \\
 x &= 54 && m\angle DBC = 54
 \end{aligned}$$

4. C

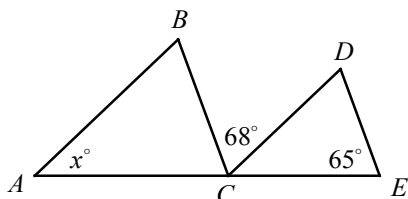


$$\begin{aligned} m\angle BAC &= m\angle DAB && \text{Definition of } \angle \text{ bisector} \\ m\angle BAC &= a && m\angle DAB = a \end{aligned}$$

Since straight angles measure 180,
 $m\angle DAE + m\angle DAB + m\angle BAC = 180$.

$$\begin{aligned} m\angle DAE + a + a &= 180 && m\angle DAB = m\angle BAC = a \\ m\angle DAE &= 180 - 2a && \text{Subtract } 2a. \\ m\angle BCA &= m\angle DAE && \text{If } DA \parallel BC, \text{ corresponding} \\ &&& \angle s \text{ are } \cong. \\ m\angle BCA &= 180 - 2a && m\angle DAE = 180 - 2a \end{aligned}$$

5. A



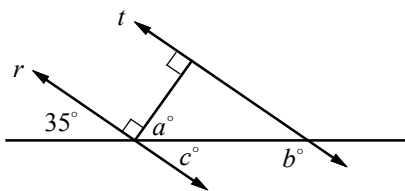
Note: Figure not drawn to scale.

$$\begin{aligned} m\angle BCA &= m\angle DEC && \text{If } DE \parallel BC, \text{ corresponding} \\ &&& \angle s \text{ are } \cong. \\ m\angle BCA &= 65 && m\angle DEC = 65 \\ m\angle DCE &= x && \text{If } AB \parallel CD, \text{ corresponding} \\ &&& \angle s \text{ are } \cong. \end{aligned}$$

Since straight angles measure 180,
 $m\angle BCA + m\angle BCD + m\angle DCE = 180$.

$$\begin{aligned} 65 + 68 + x &= 180 && \text{Substitution} \\ 133 + x &= 180 && \text{Simplify.} \\ x &= 47 \end{aligned}$$

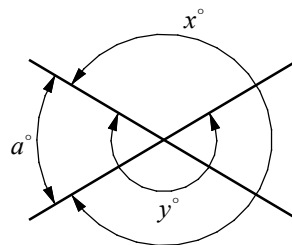
6. D



$$\begin{aligned} c &= 35 && \text{Vertical } \angle s \text{ are } \cong. \\ a + c &= 90 && \angle a \text{ and } \angle c \text{ are complementary.} \\ a + 35 &= 90 && c = 35 \\ a &= 55 \\ b + c &= 180 && \text{If } r \parallel t, \text{ consecutive interior} \\ &&& \angle s \text{ are supplementary.} \\ b + 35 &= 180 && c = 35 \\ b &= 145 \end{aligned}$$

Therefore, $a + b = 55 + 145 = 200$.

7. 540

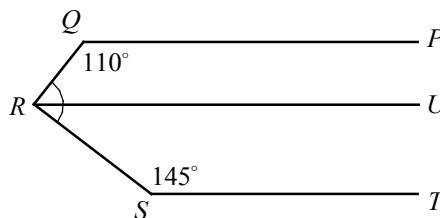


Draw $\angle a$.

$$\begin{aligned} x + a &= 360 && 360^\circ \text{ in a circle.} \\ x &= 360 - a && \text{Subtract } a \text{ from each side.} \\ y - a &= 180 && \text{Straight } \angle \text{ measures } 180. \\ y &= 180 + a && \text{Add } a \text{ to each side.} \end{aligned}$$

Therefore, $x + y = (360 - a) + (180 + a) = 540$.

8. 105



Note: Figure not drawn to scale.

Draw \overline{RU} , which is parallel to \overline{PQ} and \overline{ST} .

If two lines are parallel, then the consecutive interior angles are supplementary. Therefore,
 $m\angle PQR + m\angle QRU = 180$ and
 $m\angle RST + m\angle URS = 180$.

$$\begin{aligned} 110 + m\angle QRU &= 180 && m\angle PQR = 110 \\ m\angle QRU &= 70 && \text{Subtract } 110. \\ 145 + m\angle URS &= 180 && m\angle RST = 145 \\ m\angle URS &= 35 && \text{Subtract } 145. \end{aligned}$$

By the Angle Addition Postulate,
 $m\angle QRS = m\angle QRU + m\angle URS$.
 Substituting 70 for $m\angle QRU$ and 35 for $m\angle URS$
 gives $m\angle QRS = 70 + 35 = 105$.