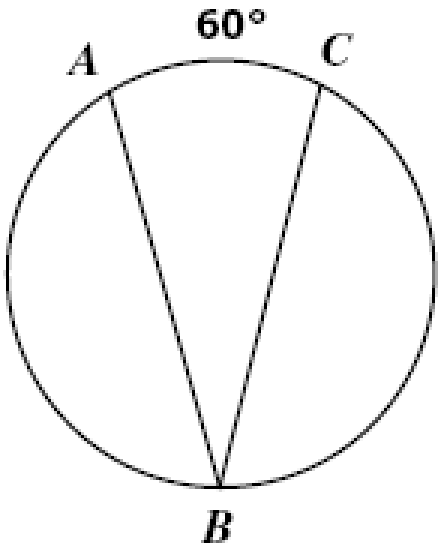
Modified and Animated By Chris Headlee
Dec 2011

CHAPTER 10 SOL PROBLEMS

SSM: Super Second-grader Methods

SOL Problems; not Dynamic Variable Problems



SSM:

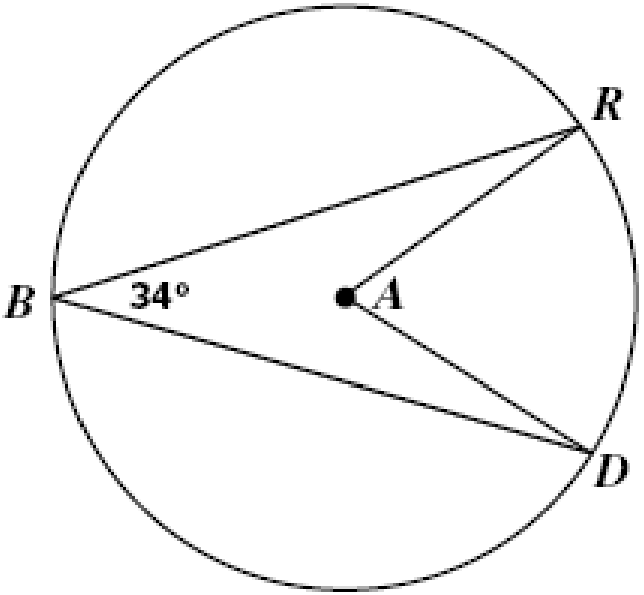
- H and J are obtuse and ∠ABC is acute
- ∠ABC is small acute so F is better choice

In the circle, what is the measure of $\angle ABC$?

F 30°
G 60°
H 120°
J 140°

Included angle = ½ m arc
= ½ (60) = 30

27 What is $m\angle DAR$ in circle A ?

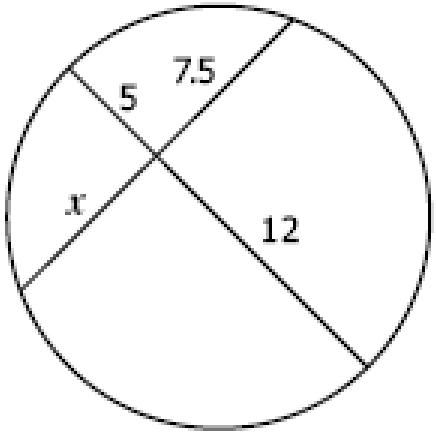


SSM:
- ∠DAR is bigger than ∠RBD
- Eliminates A and B

A 17°
B 34°
C 56°
D 68°

∠RBD is included and = ½ m arc RD
∠RAD is central and = m arc RD
so 2(34) = 68 = ∠RAD

28 Two chords intersect with the measures shown in the drawing.



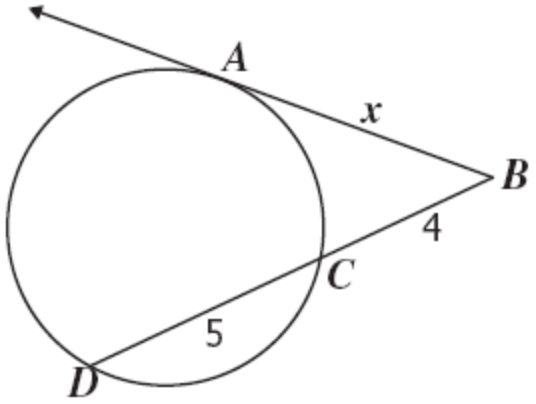
What is the value of x ?

F 8.0
G 9.5
H 10.0
J 14.5

SSM:
- by measuring x is very close to 7.5

$5 \times 12 = (7.5) \times x$
$60 = 7.5x$
$8 = x$

26 In the diagram, $\overline{AB}$ is tangent to the circle at point A, and $\overline{BD}$ intersects the circle at points C and D.



What is the value of x?

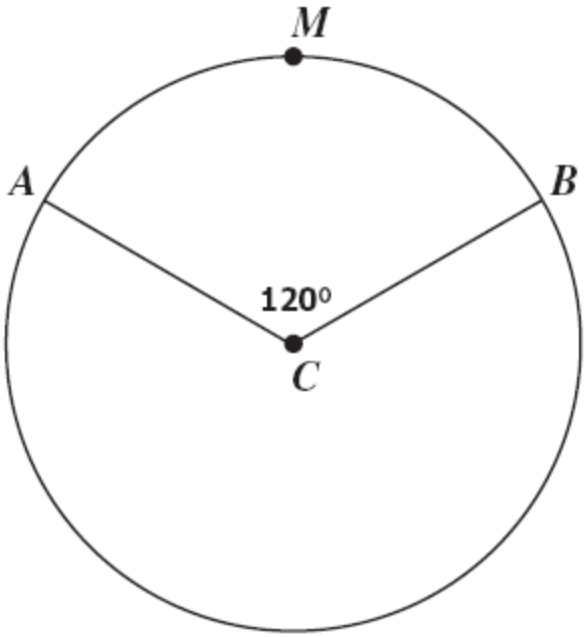
F 3
G 4
H 5
J 6

SSM:
- **measure AB and compare to DC**
- **AB > DC**

Outside × whole = Outside × whole

$$x \times (x + 0) = 4 \times (4 + 5)$$
$$x^2 = 4 \times 9$$
$$x^2 = 36$$
$$x = 6$$

29 The circumference of circle C is 144π.



What is the length of $\overset{\frown}{AMB}$?

A 8π
B 16π
C 48π
D 96π

SSM:

- **how many 120's in 360?**
- **divide 144π by 3**

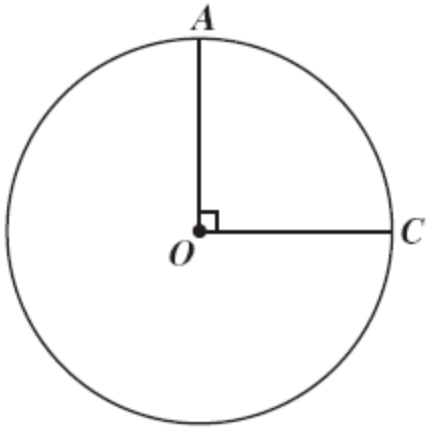
$$\frac{120}{360} = \frac{\text{arc AMB}}{C = 144\pi}$$

$$120\,(144\pi) = AMB\,(360)$$

$$120\,(144\pi) / 360 = AMB$$

$$48\pi = AMB$$

32



In circle O, the degree measure of $\overset{\frown}{AC}$ is —

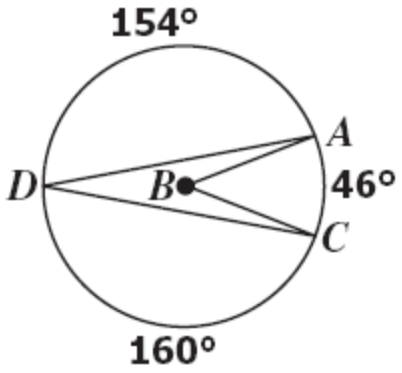
F 45°
G 90°
H 135°
J 180°

SSM:

- **looks to be a quarter of the circle, so 360 / 4 = 90**

central angle (90°) = the measure of its arc

32 **Given:** $\odot B$.



What is the $m\angle ADC$?

F 23°
G 46°
H 77°
J 80°

SSM:

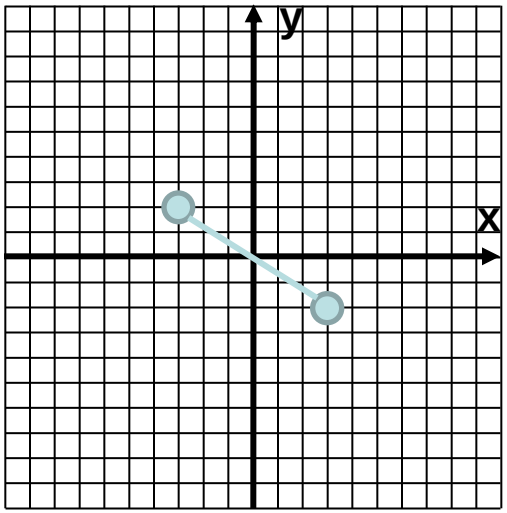
- **Use corner of scrap paper: Angle D is a small acute angle eliminate answers G, H, J**

Angle D is an inscribed angle

measure of inscribed angle = ½ measure of its arc
$\angle D = \frac{1}{2}(46) = 23$

40 The diameter of a circle has endpoints $(^{-}3, 2)$ and $(3, ^{-}2)$. Which is closest to the length of the diameter of the circle?

F 1.4
G 3.2
H 7.2
J 10.0



SSM:

- plot points on graph paper
- measure diameter with scratch paper
- use graph paper to estimate distance
- $2 < 3^{rd}$ side < 10
- Answers A &D wrong

Pythagorean Theorem

$6^2 + 4^2 = AC^2$

$36 + 16 = AC^2$

$52 = AC^2$

$7.2 = AC$

or

Distance formula

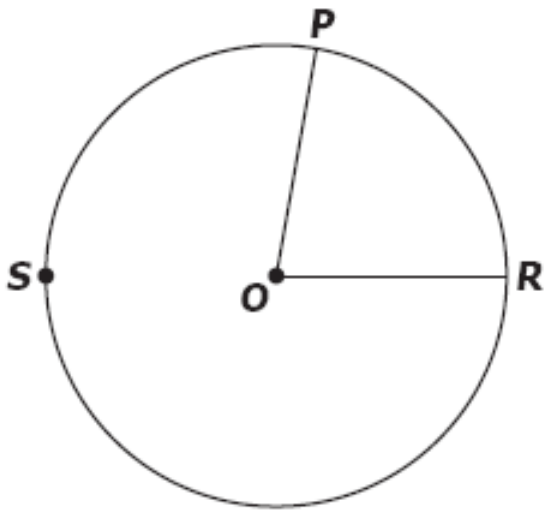
$\sqrt{(-3 - 3)^2 + (2 - (-2))^2}$

$\sqrt{(-6)^2 + (4)^2}$

$\sqrt{(36 + 16)}$

$\sqrt{52} = 7.2$

30 In circle O, the degree measure of $\overset{\frown}{PSR}$ is 280°.



What is the degree measure of $\angle POR$?

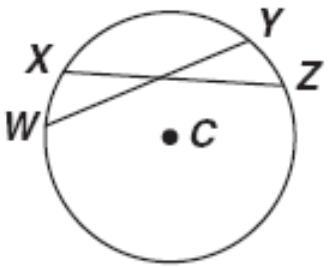
F 160°
G 85°
H 80°
J 40°

SSM:
- angle is *large* acute
- Answers F and J wrong

once around the circle is 360
so arcs PSR + PR = 360
280 + PR = 360
PR = 80

∠POR is a central angle and equal to its arc
∠POR = 80

32 In circle C, m $\overset{\frown}{WX} = 25°$, m $\overset{\frown}{XY} = 40°$, m $\overset{\frown}{YZ} = 25°$, and $WY = 24$ centimeters.



What is the length of $\overline{XZ}$?

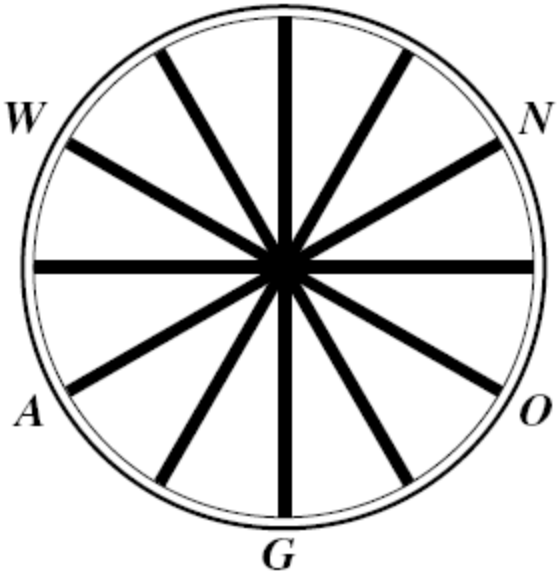
F 12 cm
G 24 cm
H 25 cm
J 65 cm

SSM:
- **measure WY and compare to XZ**

chords that cut a circle into equal arcs are equal in length

WY cuts circle into 25 + 40 = 65° arc
XZ cuts circle into 25 + 40 = 65° arc

24 **The spokes on a wagon wheel form twelve congruent central angles.**



What is the degree measure of $\overset{\frown}{WG}$?

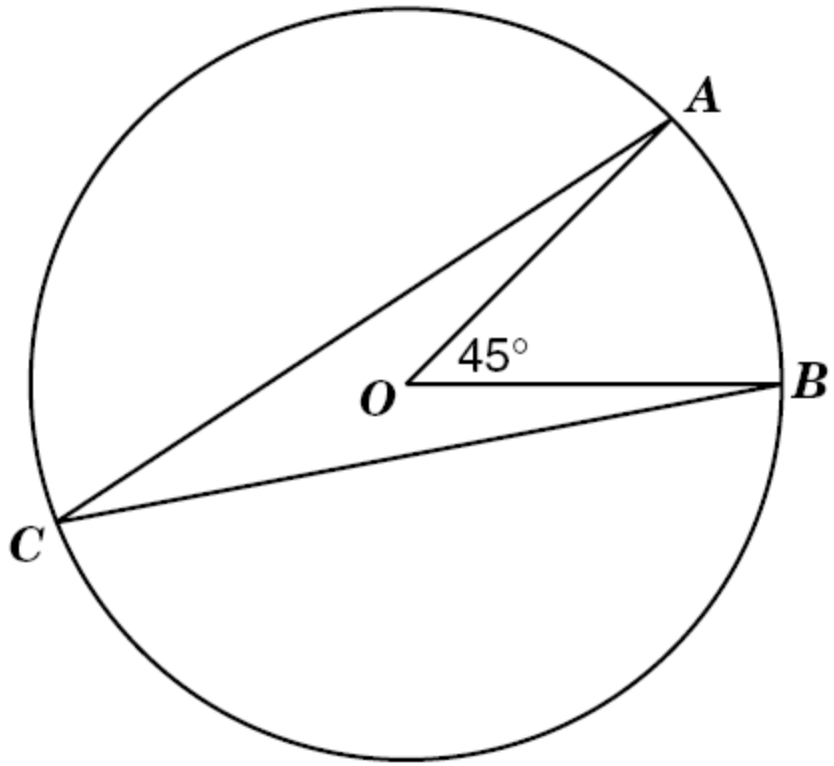
F 30°
G 90°
H 120°
J 150°

SSM:
- **arc WG is bigger than 90**

360 (once around the circle) divided into 12 parts

each part is 30 and arc WG is 4 parts or 120

29



If m∠*AOB* = 45° in circle *O*, what is m∠*ACB*?

A 22.5°

B 45°

C 67.5°

D 90°

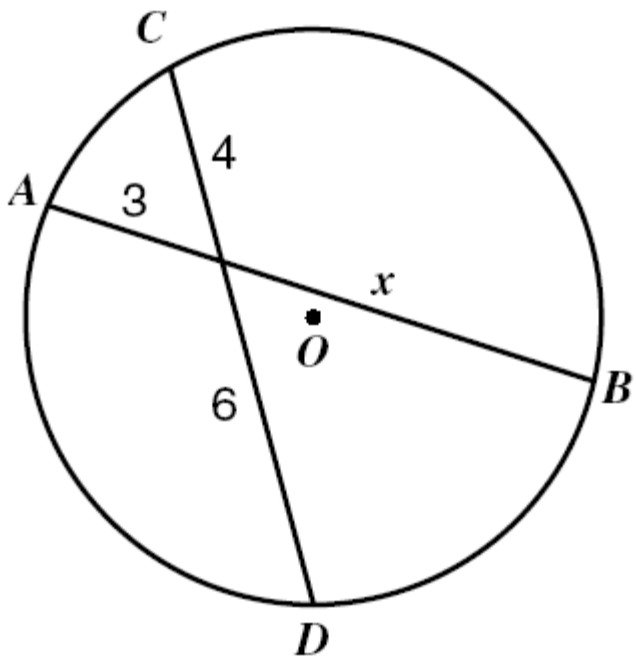
SSM:

- **Use folded paper (45°) to compare with angle ACB**
- **Only 1 answer is less than 45**

Angle AOB is a central angle and its angle is equal to the arc

Angle ACB is an included angle and its angle is ½ of the arc

30 Chords $\overline{AB}$ and $\overline{CD}$ intersect, forming segments with the measures shown.



What is the value of x?

F 5

G 8

H 10

J 24

SSM:

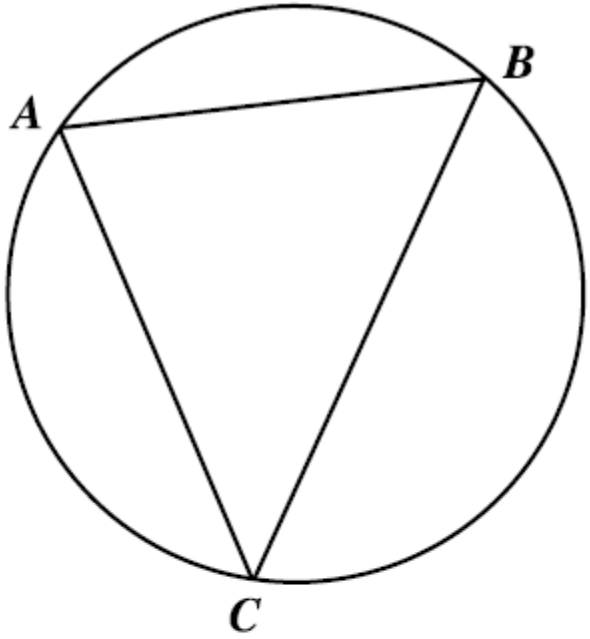
- **Use scratch paper to check for scale → NOT to scale!**
- **slightly bigger than 6, but this eliminates only F and J**

$4 \times 6 = 3x$

$24 = 3x$

$8 = x$

33



The sum of $m\overset{\frown}{AB}$ and $m\overset{\frown}{BC}$ is equal to —

A $360° - m\overset{\frown}{AC}$

B $240° - m\overset{\frown}{AC}$

C $180° - m\overset{\frown}{AC}$

D $120°$

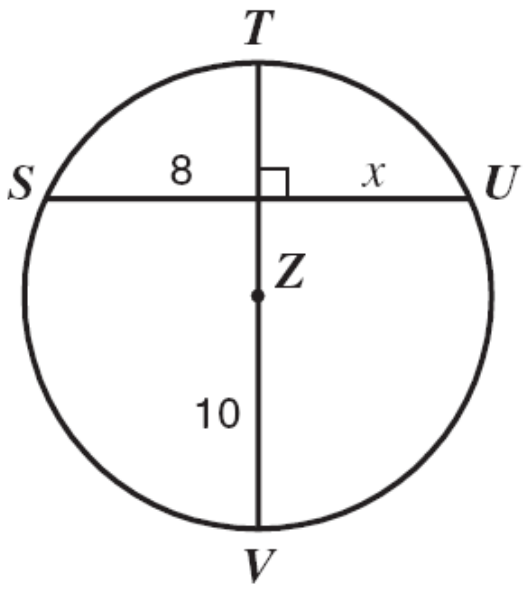
SSM:

- **circle is 360 (magic number)**

Once around circle is 360

arcs AB + BC + AC is all the way around

31 $\overline{TV}$ **is a diameter of circle** Z**.**



What is the value of x**?**

A 4
B 6
C 8
D 10

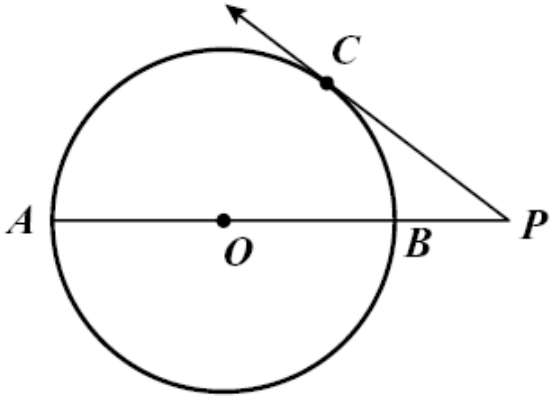
SSM:
- **Use your scrap paper to measure 8**
- **Compare to x → its equal**

radius TZ is perpendicular to chord SU

so it cuts SU into halves

x = 8

32



If $AP = 8$ and $PC = 4$, what is the measure of $\overline{AB}$, the *diameter* of this circle?

F 2

G 4

H 6

J 8

SSM:

- **measure PC and use it to estimate AB**
- **answer must be less than 8 and bigger than 4**

For outside segments:

outside × whole = outside × whole

PC × PC = BP × AP

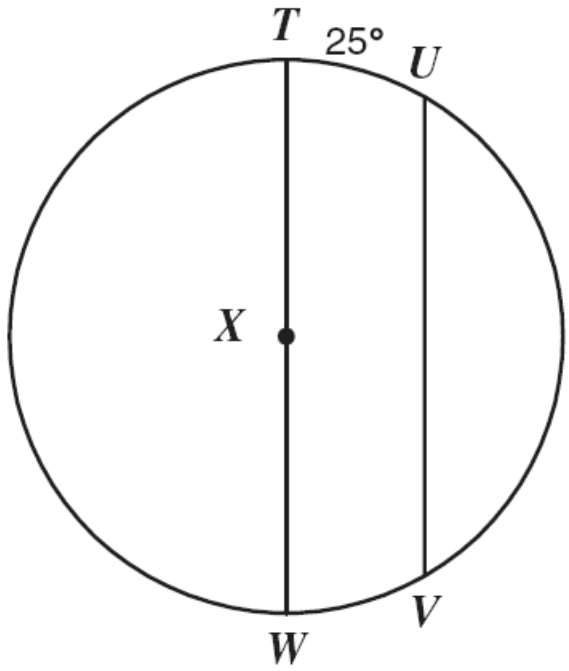
4 × 4 = BP × 8

16 = 8BP

2 = BP

AB = AP – BP = 8 – 2 = 6

33 $\overline{TW}$ **is a diameter of circle** X**, and** $\overline{TW}$ **is parallel to** $\overline{UV}$**.**



If the measure of $\overset{\frown}{TU}$ **is 25°, what is the degree measure of** $\overset{\frown}{UV}$**?**

A 115°

B 130°

C 155°

D 210°

SSM:

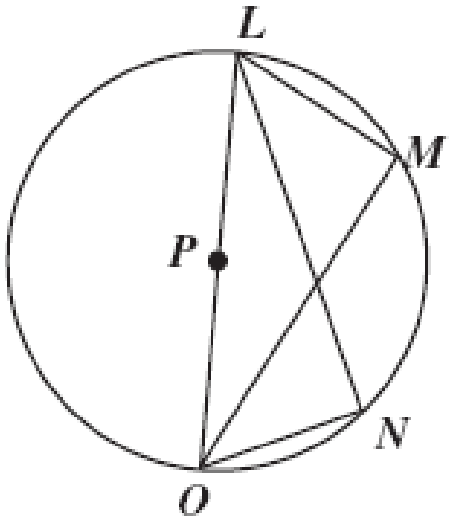
- **Use your scrap paper to measure WV it's the same as TU**
- **diameter divide circle in half**
- **answer D is wrong**

diameter divides circle in half → 180

TU and WV are same

UV = 180 – 2(25) = 180 – 50 = 130

31



If $\overline{LO}$ is a diameter of circle P, what is $m\angle LMO$?

A 30°
B 45°
C 80°
D 90°

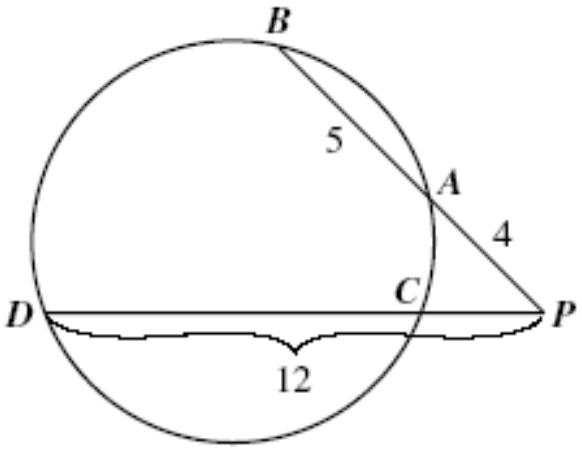
SSM:
- use corner of scratch paper to check the angle
- its right!

Angle LMO is an inscribed angle and is ½ the measure of its arc

diameter's arc = ½ 360 = 180

angle LMO = 90

32 Secants $\overline{PB}$ and $\overline{PD}$ intersect the circle at A and C, respectively.



What is the length of $\overline{PC}$?

F 3
G 4
H 5
J 6

SSM:
- **Use 4 as a scaling reference**
- **PC is less than 4**
- **only answer F fits**

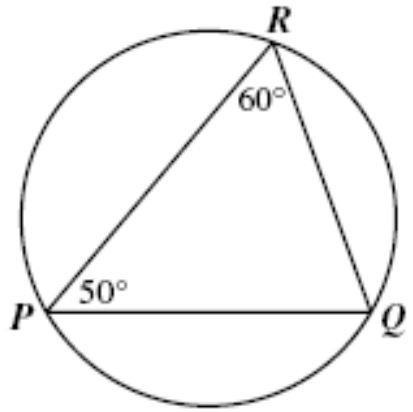
outside × whole = outside × whole

4 × (4+5) = PC × 12

36 = 12 PC

3 = PC

33 The figure shows a circle. $m\angle RPQ = 50°$ and $m\angle PRQ = 60°$.



What is the measure of $\overset{\frown}{PR}$?

A 70°
B 100°
C 120°
D 140°

SSM:

- **use our eyes to see that the arc has to be greater than 90**

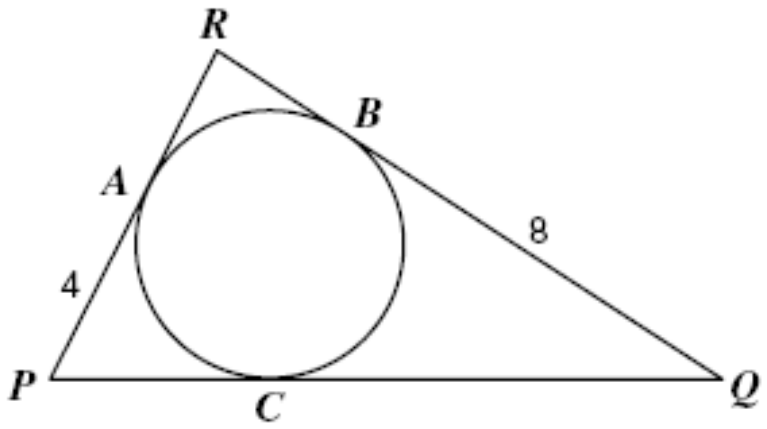
Angle RQP is inscribed and equal to 180 – (50+60) = 70

inscribed angle = ½ its arc

70 = ½ arc PR

140 = arc PR

31



A, B, and C are points of tangency. $AP = 4$ and $BQ = 8$. What is the measure of $\overline{PQ}$?

A 4
B 8
C 12
D $\sqrt{32}$

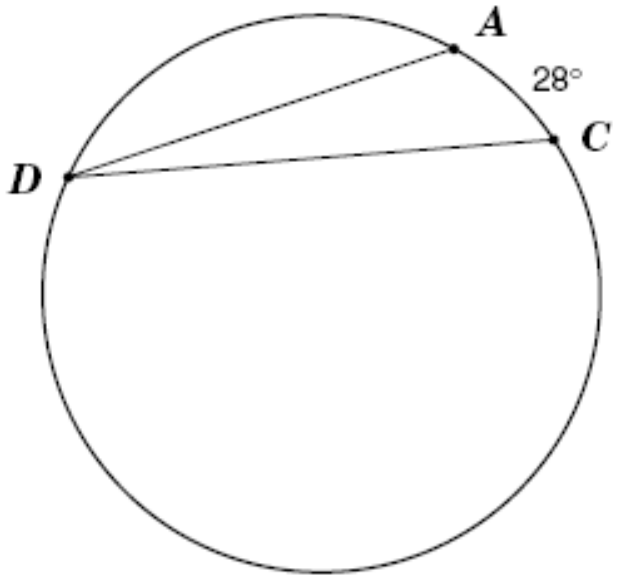
SSM:
- **measure PA as 4**
- **use it to estimate PQ**
- **its three times as long**

points of tangency → equal distance

PC = PA = 4 and QB = QC = 8

so PQ = PC + QC = 4 + 8 = 12

32 The measure of arc AC is 28°.



What is the measure of $\angle ADC$?

F 7°
G 14°
H 28°
J 56°

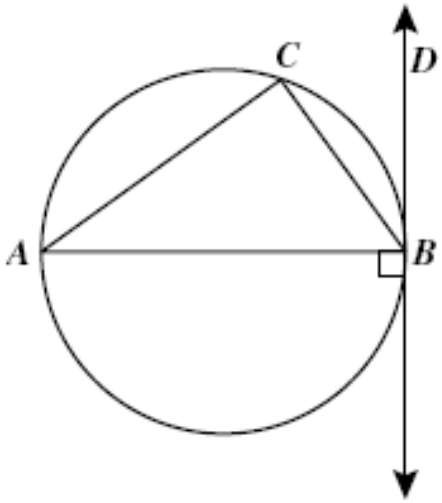
SSM:
- **angle ADC is small obtuse eliminates J**

angle ADC is an inscribed angle

its measure = ½ its arc

m∠ADC = ½ 28 = 14

33 $\overleftrightarrow{BD}$ is tangent to the circle at B and the measure of $\overset{\frown}{AC}$ is 108°.



What is the measure of $\angle CBD$?

A 118°
B 72°
C 36°
D 18°

SSM:

- **angle CBD is medium acute eliminates all but answer C**

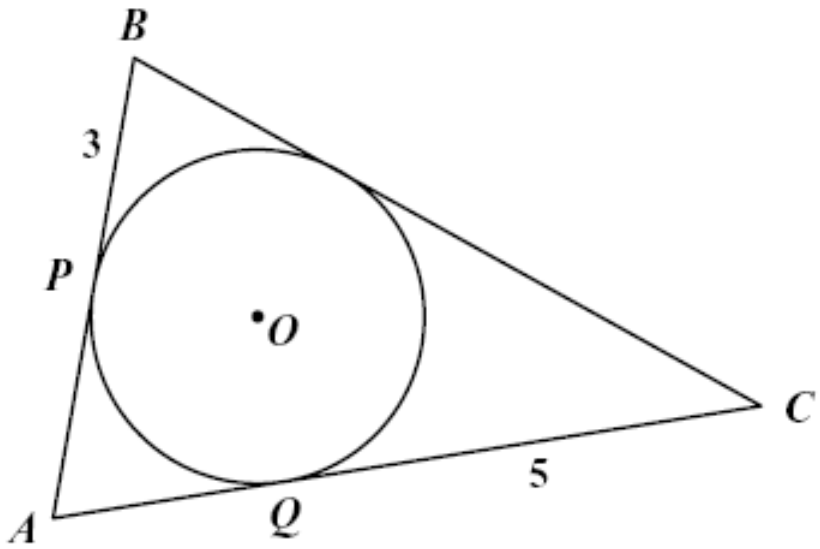
AB is a diameter (chord ⊥ tangent)

arc CB is 180 – 108 = 72

angle CBD is inscribed

angle CBD = ½ arc = ½ (72) = 36

30 Triangle ABC is circumscribed about circle O. P and Q are points of tangency such that $BP = 3$ and $CQ = 5$.



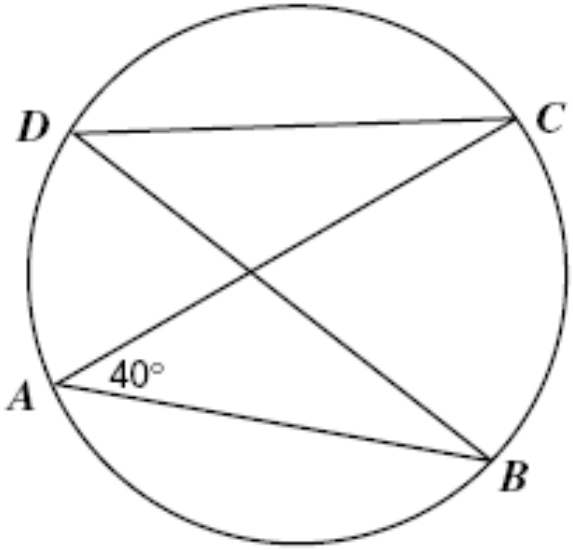
What is the measure of $\overline{BC}$?

F 3
G 4
H 5
J 8

SSM:
- **Use 5 as a ruler to estimate BC**
- **BC > 5, only answer J fits**

From a point outside a circle to its tangent is the same distance so BC = 3 + 5 = 8

31



SSM:

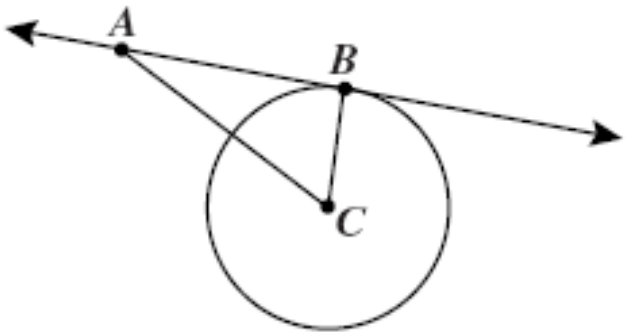
- **measure ∠CAB and compare to ∠BDC**
- **(medium acute) eliminates A and D**

If m∠*CAB* = 40°, what is m∠*CDB*?

A 20°
B 40°
C 60°
D 80°

angle BDC and angle CAB share the same arc and therefore must have the same measurement

32 $\overleftrightarrow{AB}$ is tangent to circle C at B, $AB = 15$ centimeters, and the radius of the circle is 8 centimeters.



To the nearest tenth of a centimeter, what is the length of $\overline{AC}$?

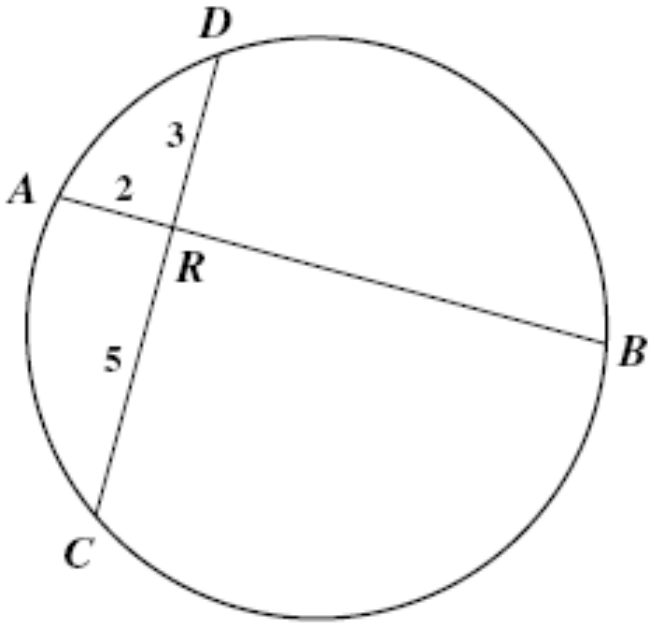
F 7.0 cm
G 12.7 cm
H 17.0 cm
J 23.0 cm

SSM:
- **AB = 15 and AC > 15 eliminates F and G**

Pythagorean Theorem:

$8^2 + 15^2 = AC^2$
$64 + 225 = AC^2$
$289 = AC^2$
$17 = AC$

31



Chords $\overline{AB}$ and $\overline{CD}$ intersect at R. Using the values shown in the diagram, what is the measure of $\overline{RB}$?

A 6
B 7.5
C 8
D 9.5

SSM:

- use AR as a scale (ruler) to measure RB
- its almost 4 times bigger eliminates A and D for sure

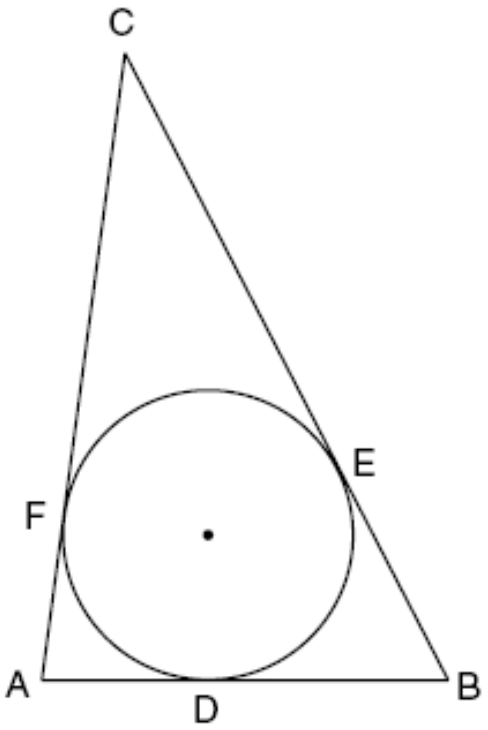
inside chords:

$AR \times RB = DR \times RC$

$2 \times RB = 3 \times 5$

$RB = 7.5$

32 The logo of an airline is a circle inscribed in a triangle.



If $AF = 3$ and $AB = 11$, then $BD =$ ___?

F 8
G 10
H 11
J 12

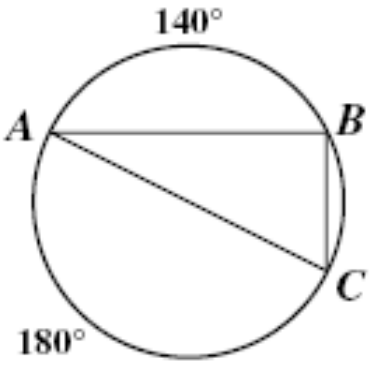
SSM:

- **Use AF as a rule to estimate BD**
- **$3 < BD < 11$ eliminates answers H and J**

distance for a point to its tangents is the same
so AF = AD
sum of the parts = whole

$$AD + BD = AB$$
$$3 + BD = 11$$
$$BD = 8$$

33



When inscribed in a certain circle, ΔABC intercepts arcs as shown in the diagram. What is the measure of $\angle BAC$?

A 90°
B 70°
C 40°
D 20°

SSM:
- **$\angle$BAC is a small acute eliminates A and B**

once around circle is 360°
arc BC = 360 – 140 – 180 = 40

$\angle$BAC is inscribed and is ½ its arc (BC)

$\angle$BAC = ½ (40) = 20

43 A circle whose center is at $(1, -3)$ passes through $(7, 5)$. What is the length of the radius of the circle?

A 10
B $\sqrt{40}$
C $\sqrt{68}$
D 14

SSM:

- plot points on graph paper
- measure radius with scratch paper
- use graph paper to estimate distance

Pythagorean Theorem

$6^2 + 8^2 = AC^2$

$36 + 64 = AC^2$

$100 = AC^2$

$10 = AC$

or

Distance formula

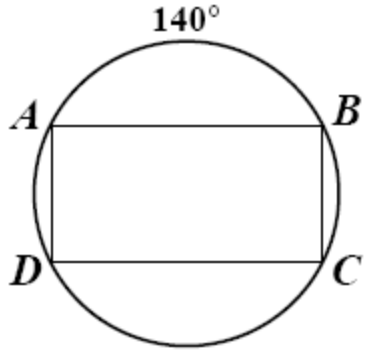
$\sqrt{(1 - 7)^2 + (-3 - 5)^2}$

$\sqrt{(-6)^2 + (-8)^2}$

$\sqrt{(36 + 64)}$

$\sqrt{100} = 10$

32



Rectangle *ABCD* is inscribed in a circle. If the measure of arc *AB* is 140°, what is the measure of arc *BC*?

F 30°
G 40°
H 60°
J 80°

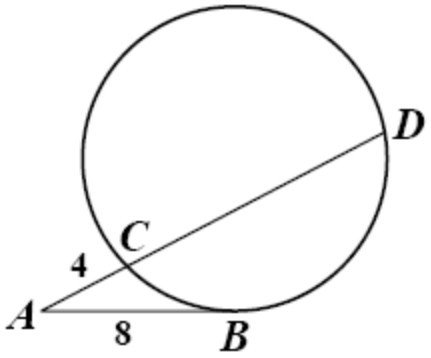
SSM:
- **arc BC + 140 must be half the circle**

Arc AB = 140, then so does DC = 140
if arc BC = x, then arc AD = x as well

Once around the circle is 360

so 360 = 280 + 2x
80 = 2x
40 = x = arc BC

33



In the drawing, A, C, and D are collinear and $\overline{AB}$ is tangent to the circle at B. Using the values shown, what is the measure of $\overline{CD}$?

A 16
B 12
C 10
D 8

SSM:
- **Use scrap paper to measure AB**
- **Use that measurement to estimate CD**
- **CD > 8**

outside × whole = outside × whole
$4 \times (4 + x) = 8 \times 8$
$16 + 4x = 64$
$4x = 48$
$x = 12$