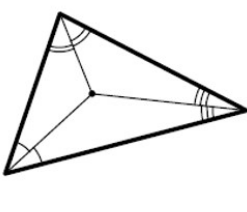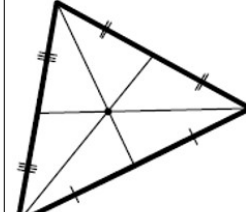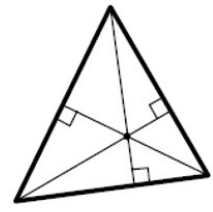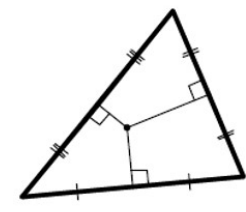Be able to identify and use the points of concurrency:

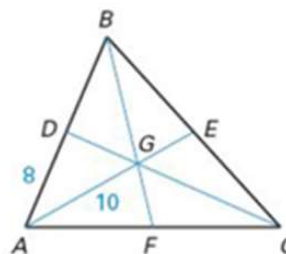For problems 1-4 identify the point of concurrency shown and what constructions form it:

Point:_____	Point:_____	Point:_____	Point:_____
Formed By three:	Formed By three:	Formed By three:	Formed By three:
_____	_____	_____	_____

5. Point G is the centroid of ΔABC. $\overline{AD} = 8, \overline{AG} = 10, and\ \overline{CD} = 18$.

Find the length of the given segments:

$\overline{BD} =$_____ $\overline{AE} =$_____

$\overline{AB} =$_____ $\overline{CG} =$_____

$\overline{EG} =$_____ $\overline{DG} =$_____

6.

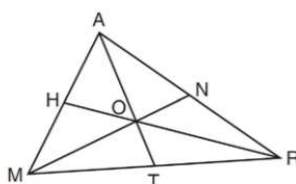In triangle *SRK* below, medians $\overline{SC}, \overline{KE}$, and $\overline{RL}$ intersect at *M*.
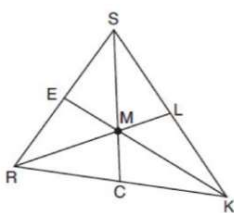
Which statement must always be true?
1) $3(MC) = SC$
2) $MC = \frac{1}{3}(SM)$
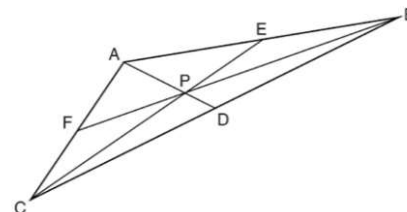3) $RM = 2MC$
4) $SM = KM$

7.

In the diagram below of $\triangle MAR$, medians $\overline{MN}, \overline{AT},$ and $\overline{RH}$ intersect at *O*.

If $TO = 10$, what is the length of $\overline{TA}$?
1) 30
2) 25
3) 20
4) 15

8. In the diagram below of $\triangle ABC, \overline{AE} \cong \overline{BE},$ $\overline{AF} \cong \overline{CF},$ and $\overline{CD} \cong \overline{BD}.$
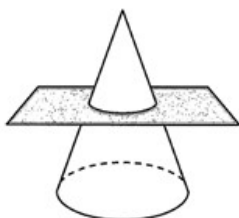
Point *P* must be the
1) centroid
2) circumcenter
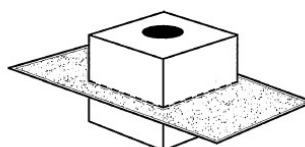3) incenter
4) orthocenter

9.

A cross-section is cut from the circular cone below.

What is the shape of the cross-section?

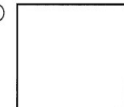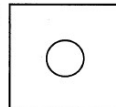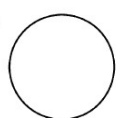Ⓐ Square
Ⓑ Semicircle
Ⓒ Triangle
Ⓓ Circle

10.

A cube with a cylinder cut from its center is cut along the plane shown below.

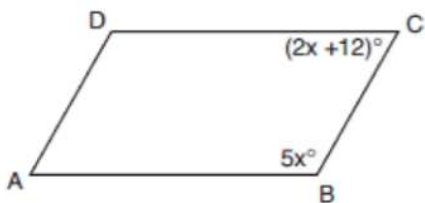Which of the following is the cross-section of this solid?

Ⓕ   Ⓗ

Ⓖ   Ⓙ

Be able to identify and use the proprieties of a quadrilaterals, specifically parallelograms:

11.
In the accompanying diagram of parallelogram $ABCD$, $m\angle B = 5x$, and $m\angle C = 2x + 12$. Find the number of degrees in $\angle D$.
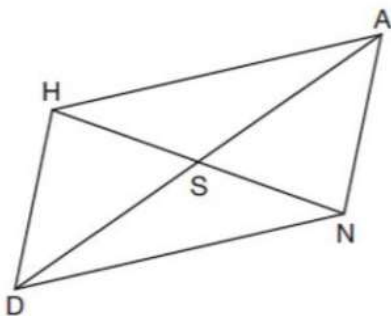

12.
As shown in the diagram below, the diagonals of parallelogram $QRST$ intersect at E. If $QE = x^2 + 6x$, $SE = x + 14$, and $TE = 6x - 1$, determine TE algebraically.

13.
In the diagram below of parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$, $m\angle 1 = 45$ and $m\angle DCB = 120$.
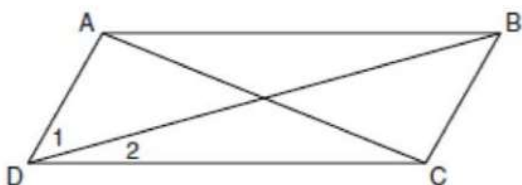
What is the measure of $\angle 2$?
1) $15°$
2) $30°$
3) $45°$
4) $60°$
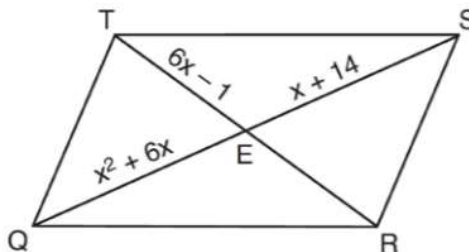
14.
In quadrilateral $BLUE$ shown below, $\overline{BE} \cong \overline{UL}$.

Which information would be sufficient to prove quadrilateral $BLUE$ is a parallelogram?
1) $\overline{BL} \parallel \overline{EU}$
2) $\overline{LU} \parallel \overline{BE}$
3) $\overline{BE} \cong \overline{BL}$
4) $\overline{LU} \cong \overline{EU}$

15.
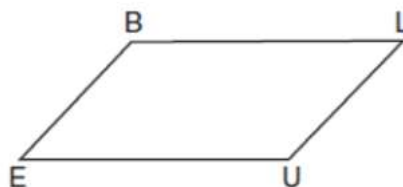Parallelogram $HAND$ is drawn below with diagonals $\overline{HN}$ and $\overline{AD}$ intersecting at S.

Which statement is always true?

1) $AN = \dfrac{1}{2} AD$

2) $AS = \dfrac{1}{2} AD$

3) $\angle AHS \cong \angle ANS$

4) $\angle HDS \cong \angle NDS$

16.
Which statement about parallelograms is always true?
1) The diagonals are congruent.
2) The diagonals bisect each other.
3) The diagonals are perpendicular.
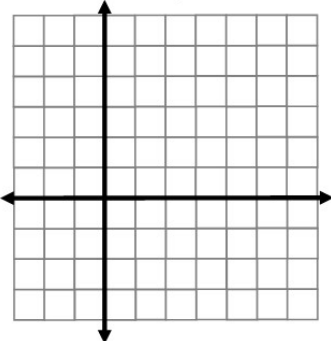4) The diagonals bisect their respective angles.

17.
Quadrilateral $MATH$ has both pairs of opposite sides congruent and parallel. Which statement about quadrilateral $MATH$ is always true?
1) $\overline{MT} \cong \overline{AH}$
2) $\overline{MT} \perp \overline{AH}$
3) $\angle MHT \cong \angle ATH$
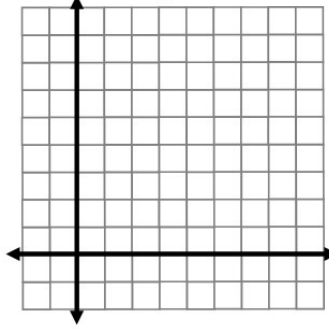4) $\angle MAT \cong \angle MHT$

Be able to identify and use the proprieties of a circles in general and standard form.
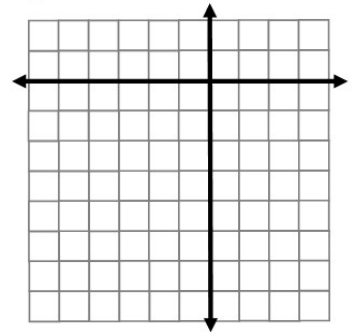
18. **Graph the following circle:**

a. $(x - 3)^2 + (y + 1)^2 = 4$

b. $(x - 2)^2 + (y - 5)^2 = 9$

c. $(y + 4)^2 + (x + 2)^2 = 16$

19. **For each circle: Identify its center and radius.**

a. $(x + 3)^2 + (y - 1)^2 = 4$

b. $x^2 + (y - 3)^2 = 18$

c. $(y + 8)^2 + (x + 2)^2 = 72$

Center:_____   Center:_____   Center:_____

Radius:_____   Radius:_____   Radius:_____

20. **Write the equation of the following circles:**
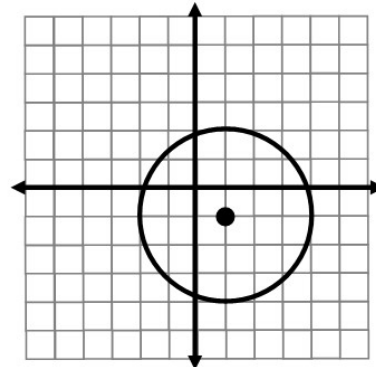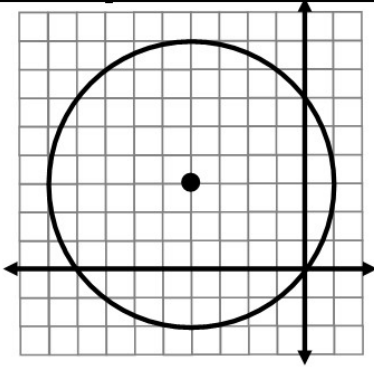
21. **Find the standard form, center, and radius of the following circles:**

$x^2 + y^2 - 4x + 8y - 5 = 0$

b) $x^2 + y^2 + 9y + 5 = 0$

Center:_____   Center:_____

Radius:_____   Radius:_____

22. $x^2 - 2x + y^2 + 8y - 8 = 0$ $x^2 + y^2 - 6x + 4y - 3 = 0$

Center:_____   Center:_____

Radius:_____   Radius:_____

23. A circle has the equation $(x-2)^2 + (y+3)^2 = 36$. What are the coordinates of its center and the length of its radius?

1) $(-2,3)$ and 6
2) $(2,-3)$ and 6
3) $(-2,3)$ and 36
4) $(2,-3)$ and 36

24. The center and radius of the given circle $(x-3)^2 + (y+8)^2 = 39$ are:

1) $(3,-8), r = 39$
2) $(-3,-8), r = \sqrt{39}$
3) $(-3,8), r = \sqrt{39}$
4) $(3,-8), r = \sqrt{39}$

25. What are the coordinates of the center of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?

1) $(-8,-3)$
2) $(-8,3)$
3) $(8,-3)$
4) $(8,3)$

26. The equation $4x^2 - 24x + 4y^2 + 72y = 76$ is equivalent to

1) $4(x-3)^2 + 4(y+9)^2 = 76$
2) $4(x-3)^2 + 4(y+9)^2 = 121$
3) $4(x-3)^2 + 4(y+9)^2 = 166$
4) $4(x-3)^2 + 4(y+9)^2 = 436$

27. The equation of a circle is $x^2 + y^2 - 6x + 2y = 6$. What are the coordinates of the center and the length of the radius of the circle?

1) center $(-3,1)$ and radius 4
2) center $(3,-1)$ and radius 4
3) center $(-3,1)$ and radius 16
4) center $(3,-1)$ and radius 16

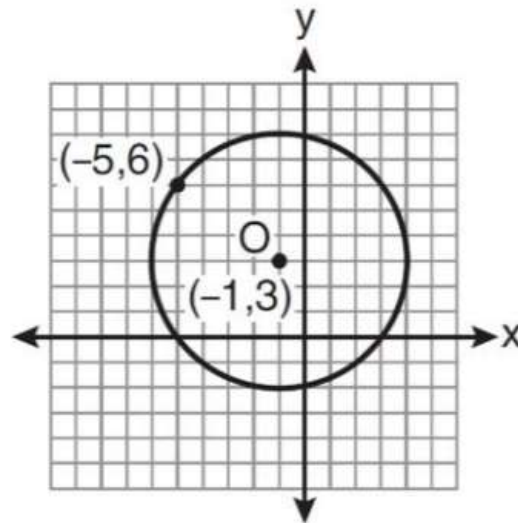28. What is an equation of circle O shown in the graph below?
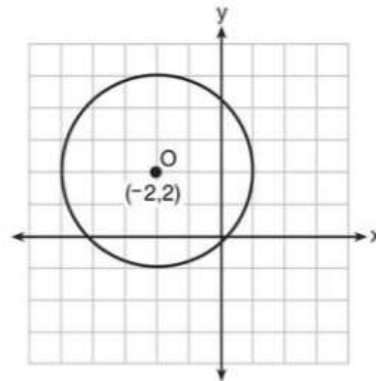
1) $(x+2)^2 + (y-2)^2 = 9$
2) $(x+2)^2 + (y-2)^2 = 3$
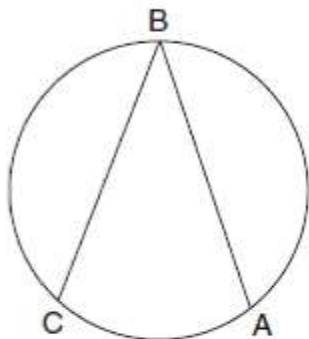3) $(x-2)^2 + (y+2)^2 = 9$
4) $(x-2)^2 + (y+2)^2 = 3$

29. What is an equation of circle O shown in the graph below?

1) $(x+1)^2 + (y-3)^2 = 25$
2) $(x-1)^2 + (y+3)^2 = 25$
3) $(x-5)^2 + (y+6)^2 = 25$
4) $(x+5)^2 + (y-6)^2 = 25$

Be able to identify and use the proprieties of a both angles, arcs, and line segments using circles.

30. The new corporate logo created by the design engineers at Magic Motors is shown in the accompanying diagram.
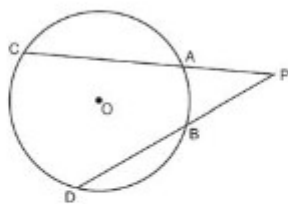

If chords $\overline{BA}$ and $\overline{BC}$ are congruent and $m\overparen{BC} = 140$, what is $m\angle B$?
1) 40
2) 80
3) 140
4) 280

31.

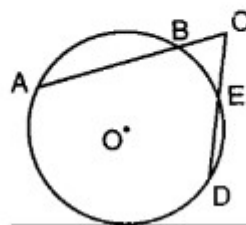In the diagram below of circle O, $\overline{PAC}$ and $\overline{PBD}$ are secants.

If $m\overparen{CD} = 70$ and $m\overparen{AB} = 20$, what is the degree measure of $\angle P$?
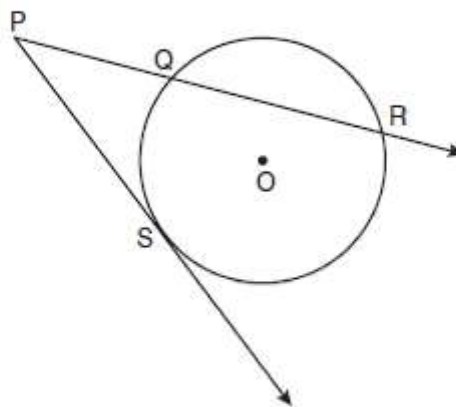1) 25
2) 35
3) 45
4) 50

32. In a circle, chords $\overline{AB}$ and $\overline{CD}$ intersect at point E. If $AE = x + 1$, $CE = 2$, and $ED = 3$, find the value of x.

33. In the accompanying diagram of circle O, secant $\overline{CBA}$ and $\overline{CED}$ intersect at C. If $AC = 12$, $BC = 3$, and $DC = 9$, find EC.

34

In the diagram below, $\overline{PS}$ is a tangent to circle O at point S, $\overline{PQR}$ is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.
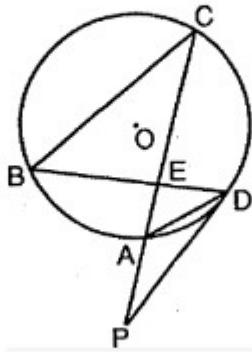

(Not drawn to scale)

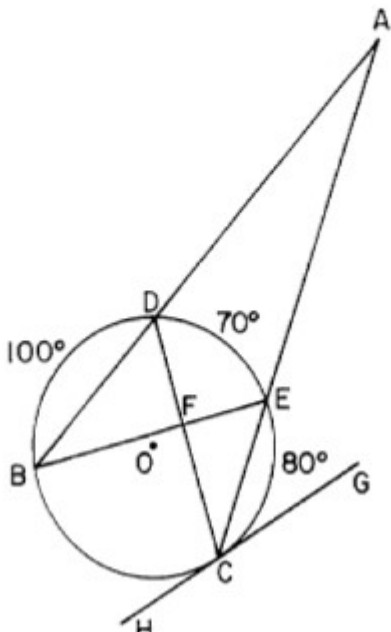What is the length of $\overline{PS}$?
1) 6
2) 9
3) 3
4) 27

35. In the accompanying diagram, $\overline{PD}$ is tangent to circle O at D, $\overline{PAC}$ is a secant, chords $\overline{BD}$ and $\overline{AC}$ intersect at E, chord $\overline{AD}$ is drawn, $m\overset{\frown}{BC} = m\overset{\frown}{CA}$, $m\overset{\frown}{BC}$ is twice $m\overset{\frown}{AB}$, and $m\angle DAC = 48$.

Find $m\overset{\frown}{AB}$, $m\overset{\frown}{AD}$, $m\angle CPD$, $m\angle CED$ and $m\angle ADP$.

37. In circle A below, chord $\overline{BC}$ and diameter $\overline{DAE}$ intersect at F.

If $m\overset{\frown}{CD} = 46°$ and $m\overset{\frown}{DB} = 102°$, what is $m\angle CFE$?
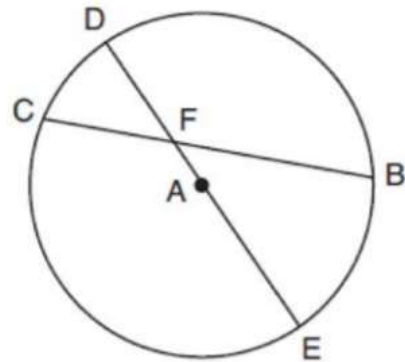
36.

In the accompanying diagram of circle O, $\overline{ADB}$ and $\overline{AEC}$ are secants, chords $\overline{BE}$ and $\overline{CD}$ intersect at F, tangent $\overline{GH}$ intersects circle O at C, $m\overset{\frown}{BD} = 100$, $m\overset{\frown}{DE} = 70$, and $m\overset{\frown}{EC} = 80$.

(a) $m\angle BAC$
(b) $m\angle BDC$
(c) $m\angle CFE$
(d) $m\angle GCE$
(e) $m\angle AEB$

38.

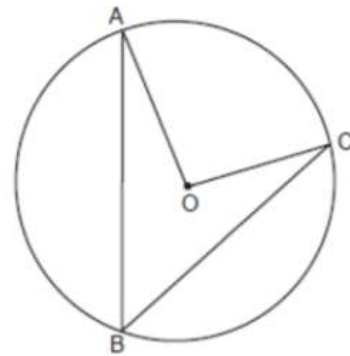In the accompanying diagram of circle O, $\overline{AB}$ and $\overline{BC}$ are chords and $m\angle AOC = 96$. What is $m\angle ABC$?

1) 32
2) 48
3) 96
4) 192