Name: _____   Date: _____

GEOMETRY LIVE REVIEW PROBLEMS - 2018
eMATHinstruction

## RIGID MOTION TRANSFORMATIONS AND CONGRUENCY

June 2015

2 The vertices of $\triangle JKL$ have coordinates $J(5,1)$, $K(-2,-3)$, and $L(-4,1)$. Under which transformation is the image $\triangle J'K'L'$ *not* congruent to $\triangle JKL$?

   (1) a translation of two units to the right and two units down

   (2) a counterclockwise rotation of 180 degrees around the origin

   (3) a reflection over the x-axis

   (4) a dilation with a scale factor of 2 and centered at the origin

June 2015

**4** In the diagram below, congruent figures 1, 2, and 3 are drawn.
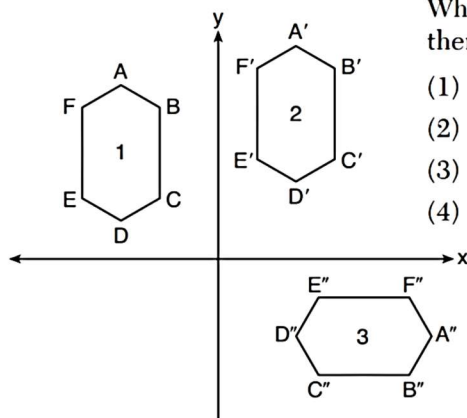
Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?

   (1) a reflection followed by a translation

   (2) a rotation followed by a translation

   (3) a translation followed by a reflection

   (4) a translation followed by a rotation

January 2016

**11** Quadrilateral $ABCD$ is graphed on the set of axes below.
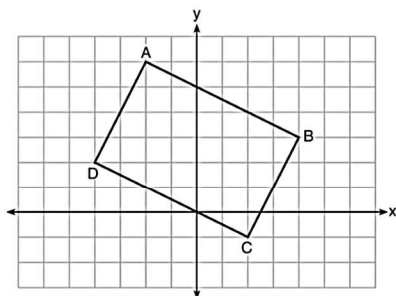
   (1) no and $C'(1,2)$ (3) yes and $A'(6,2)$

   (2) no and $D'(2,4)$ (4) yes and $B'(-3,4)$

When $ABCD$ is rotated $90°$ in a counterclockwise direction about the origin, its image is quadrilateral $A'B'C'D'$. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?
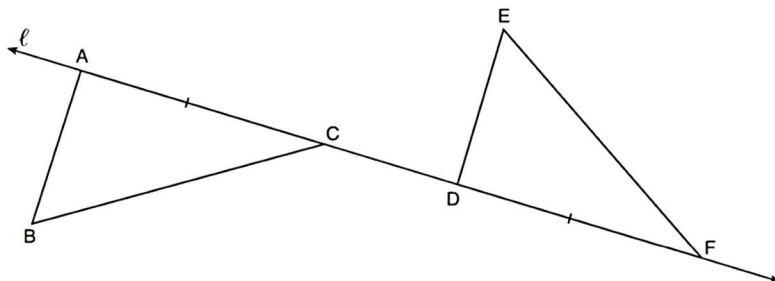
January 2016

28 As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations.
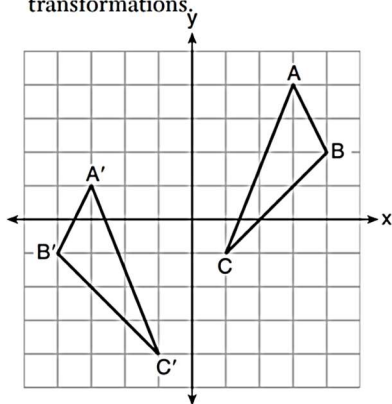
Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.
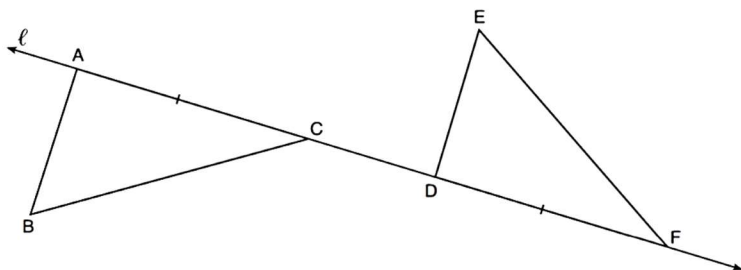
August 2015

34 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ.

Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ, such that point D is mapped onto point A. Determine and state the location of F'. Explain your answer.

Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ. Suppose that E'' is located at B. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.
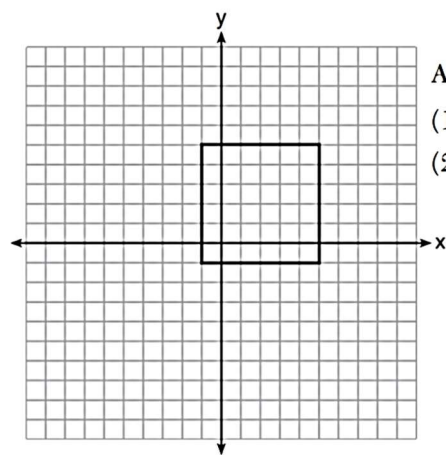
June 2015

10 Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?

(1) octagon   (3) hexagon

(2) decagon   (4) pentagon

August 2015

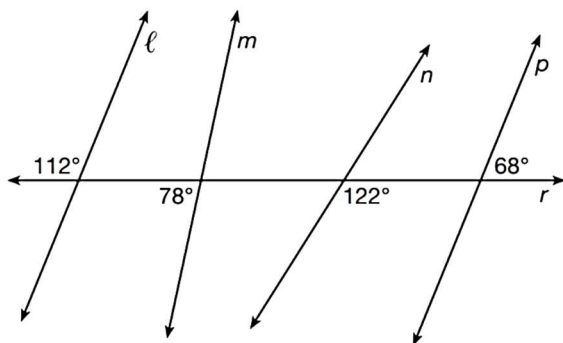**5** In the diagram below, a square is graphed in the coordinate plane.

A reflection over which line does *not* carry the square onto itself?

(1) $x = 5$ (3) $y = x$

(2) $y = 2$ (4) $x + y = 4$

PARALLEL LINES

August 2016

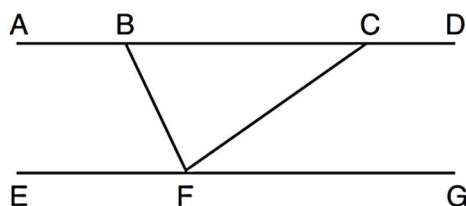**1** In the diagram below, lines ℓ, m, n, and p intersect line r.

Which statement is true?

(1) $\ell \parallel n$ (3) $m \parallel p$

(2) $\ell \parallel p$ (4) $m \parallel n$

June 2015

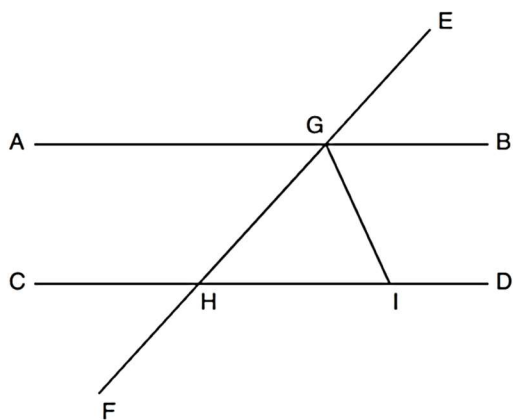**17** Steve drew line segments *ABCD*, *EFG*, *BF*, and *CF* as shown in the diagram below. Scalene △*BFC* is formed.

Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?

(1) ∠*CFG* ≅ ∠*FCB*   (3) ∠*EFB* ≅ ∠*CFB*

(2) ∠*ABF* ≅ ∠*BFC*   (4) ∠*CBF* ≅ ∠*GFC*

June 2015

32 In the diagram below, $\overline{EF}$ intersects $\overline{AB}$ and $\overline{CD}$ at *G* and *H*, respectively, and $\overline{GI}$ is drawn such that $\overline{GH} \cong \overline{IH}$.
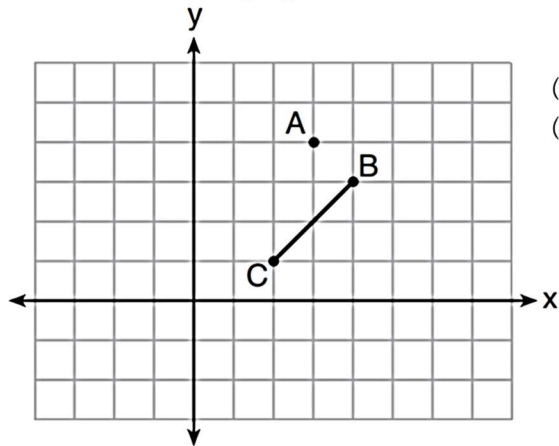
If m∠*EGB* = 50° and m∠*DIG* = 115°, explain why $\overline{AB} \parallel \overline{CD}$.

DILATIONS

January 2017

13 On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.
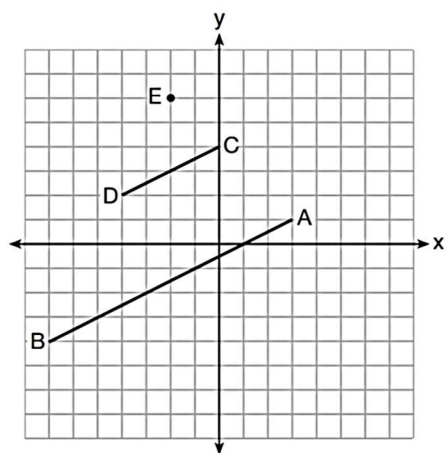
(1) $B'(5,2)$ and $C'(1,-2)$ (3) $B'(5,0)$ and $C'(1,-2)$

(2) $B'(6,1)$ and $C'(0,-1)$ (4) $B'(5,2)$ and $C'(3,0)$

What are the coordinates of B' and C' after $\overline{BC}$ undergoes a dilation centered at point A with a scale factor of 2?

August 2015

18 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor k with center E.
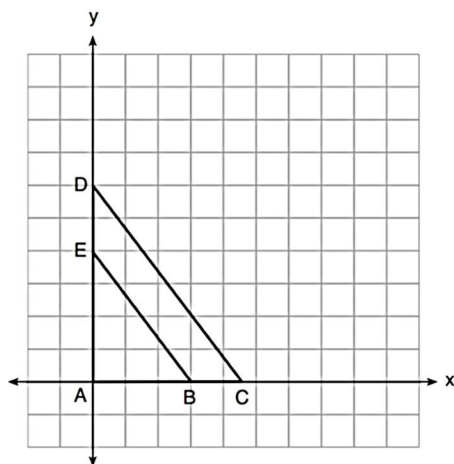
Which ratio is equal to the scale factor k of the dilation?

(1) $\dfrac{EC}{EA}$ (3) $\dfrac{EA}{BA}$

(2) $\dfrac{BA}{EA}$ (4) $\dfrac{EA}{EC}$

August 2015

23 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.
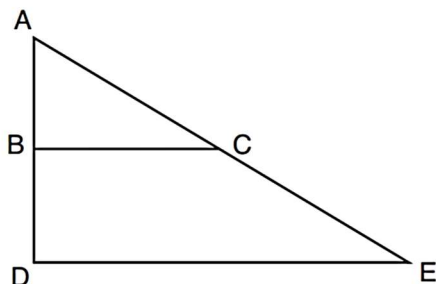
The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is

(1) $\frac{2}{3}$

(2) $\frac{3}{2}$

(3) $\frac{3}{4}$

(4) $\frac{4}{3}$

August 2016

6 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.

Which statement is always true?

(1) $2AB = AD$

(2) $\overline{AD} \perp \overline{DE}$

(3) $AC = CE$
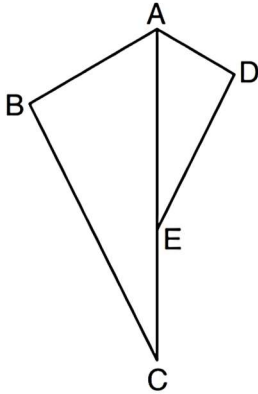
(4) $\overline{BC} \parallel \overline{DE}$

August 2016

21 Line segment $A'B'$, whose endpoints are $(4,-2)$ and $(16,14)$, is the image of $\overline{AB}$ after a dilation of $\frac{1}{2}$ centered at the origin. What is the length of $\overline{AB}$?

(1) 5

(2) 10

(3) 20

(4) 40

January 2017

2 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line AC followed by a dilation of scale factor $\dfrac{AE}{AC}$ centered at point A.

Which statement must be true?

(1) $m\angle BAC = m\angle AED$

(2) $m\angle ABC = m\angle ADE$

(3) $m\angle DAE = \frac{1}{2}m\angle BAC$

(4) $m\angle ACB = \frac{1}{2}m\angle DAB$

January 2016

31 Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m.
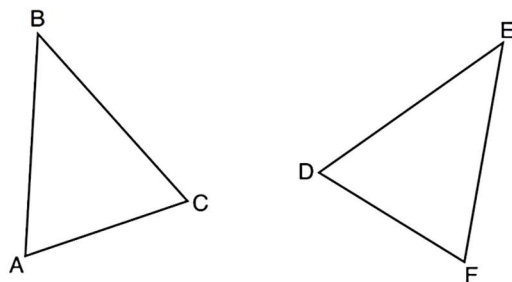
August 2015

24 Line $y = 3x - 1$ is transformed by a dilation with a scale factor of 2 and centered at $(3,8)$. The line's image is

(1) $y = 3x - 8$

(2) $y = 3x - 4$

(3) $y = 3x - 2$

(4) $y = 3x - 1$

June 2015

24 Which statement is sufficient evidence that △*DEF* is congruent to △*ABC*?

(1) *AB* = *DE* and *BC* = *EF*

(2) ∠*D* ≅ ∠*A*, ∠*B* ≅ ∠*E*, ∠*C* ≅ ∠*F*

(3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.

(4) There is a sequence of rigid motions that maps point *A* onto point *D*, $\overline{AB}$ onto $\overline{DE}$, and ∠*B* onto ∠*E*.
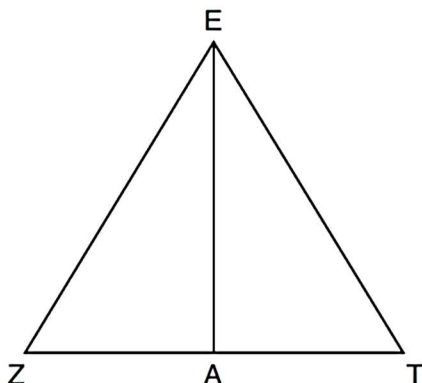
June 2016

7 Two right triangles must be congruent if

(1) an acute angle in each triangle is congruent

(2) the lengths of the hypotenuses are equal

(3) the corresponding legs are congruent

(4) the areas are equal

June 2016

19 Line segment *EA* is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.
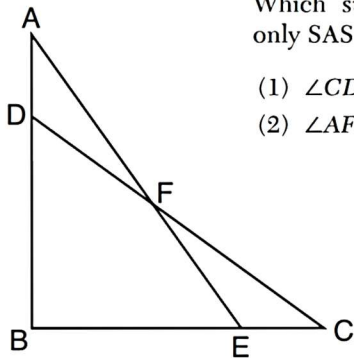

Which conclusion can *not* be proven?

(1) $\overline{EA}$ bisects angle *ZET*.

(2) Triangle *EZT* is equilateral.

(3) $\overline{EA}$ is a median of triangle *EZT*.

(4) Angle *Z* is congruent to angle *T*.

August 2016

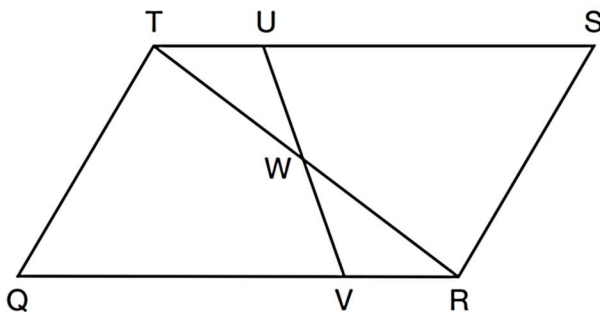**22** Given: △ABE and △CBD shown in the diagram below with $\overline{DB} \cong \overline{BE}$

Which statement is needed to prove △ABE ≅ △CBD using only SAS ≅ SAS?

(1) ∠CDB ≅ ∠AEB   (3) $\overline{AD} \cong \overline{CE}$

(2) ∠AFD ≅ ∠EFC   (4) $\overline{AE} \cong \overline{CD}$

QUADRILATERALS

January 2016

3 In parallelogram QRST shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.

If m∠S = 60°, m∠SRT = 83°, and m∠TWU = 35°, what is m∠WVQ?

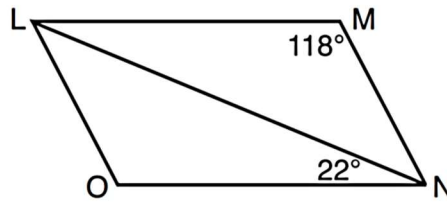(1) 37°   (3) 72°

(2) 60°   (4) 83°

June 2015

13 Quadrilateral ABCD has diagonals $\overline{AC}$ and $\overline{BD}$. Which information is *not* sufficient to prove ABCD is a parallelogram?

(1) $\overline{AC}$ and $\overline{BD}$ bisect each other.

(2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$

(3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$

(4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

June 2015

26 The diagram below shows parallelogram $LMNO$ with diagonal $\overline{LN}$, m$\angle M = 118°$, and m$\angle LNO = 22°$.

L M 118° 22° N O

Explain why m$\angle NLO$ is 40 degrees.

August 2015

1 A parallelogram must be a rectangle when its

(1) diagonals are perpendicular

(2) diagonals are congruent

(3) opposite sides are parallel

(4) opposite sides are congruent

June 2016

9 In parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. Which statement does *not* prove parallelogram $ABCD$ is a rhombus?

(1) $\overline{AC} \cong \overline{DB}$

(2) $\overline{AB} \cong \overline{BC}$

(3) $\overline{AC} \perp \overline{DB}$

(4) $\overline{AC}$ bisects $\angle DCB$.

January 2017

5 In the diagram below, if $\triangle ABE \cong \triangle CDF$ and $\overline{AEFC}$ is drawn, then it could be proven that quadrilateral $ABCD$ is a
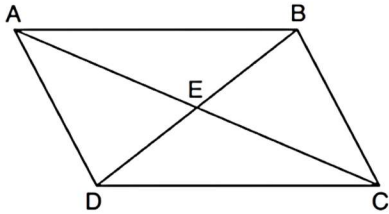
B C F E A D
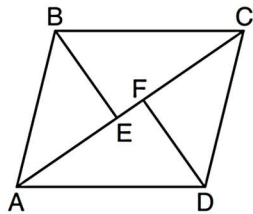
(1) square   (3) rectangle

(2) rhombus   (4) parallelogram
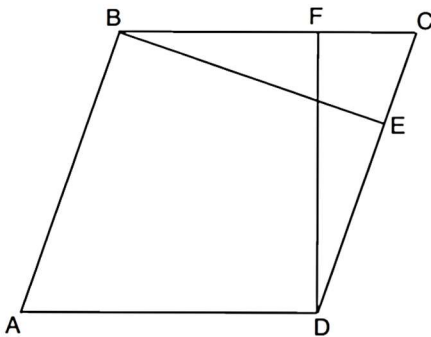
QUADRILATERAL PROOFS

June 2015

33 Given: Quadrilateral $ABCD$ is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E

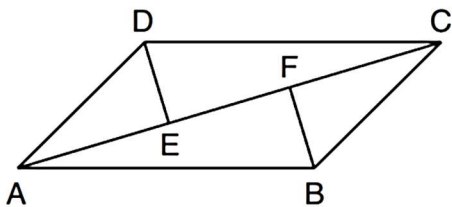Prove: $\triangle AED \cong \triangle CEB$

August 2015

35 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, and $\overline{CE} \cong \overline{CF}$.

Prove $ABCD$ is a rhombus.

January 2017

35 In quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points F and E.
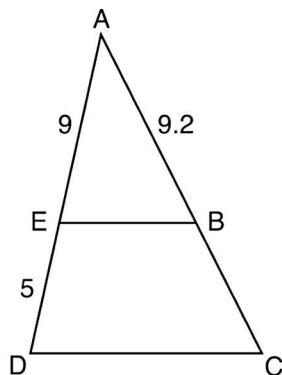

Prove: $\overline{AE} \cong \overline{CF}$

SIMILARITY

June 2015

11 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.
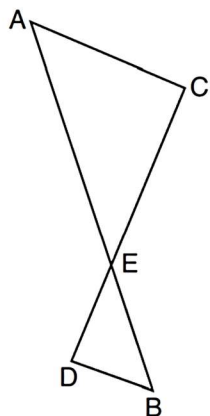
What is the length of $\overline{AC}$, to the *nearest tenth*?

(1) 5.1   (3) 14.3

(2) 5.2   (4) 14.4

August 2015

19 As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at E, and $\overline{AC} \parallel \overline{BD}$.
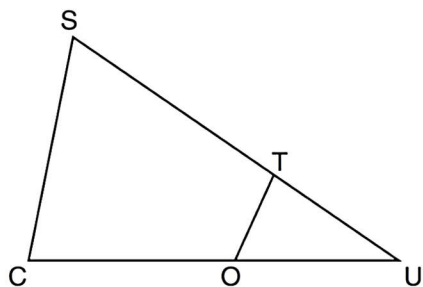
Given $\triangle AEC \sim \triangle BED$, which equation is true?

(1) $\dfrac{CE}{DE} = \dfrac{EB}{EA}$ (3) $\dfrac{EC}{AE} = \dfrac{BE}{ED}$

(2) $\dfrac{AE}{BE} = \dfrac{AC}{BD}$ (4) $\dfrac{ED}{EC} = \dfrac{AC}{BD}$

January 2016

24 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.
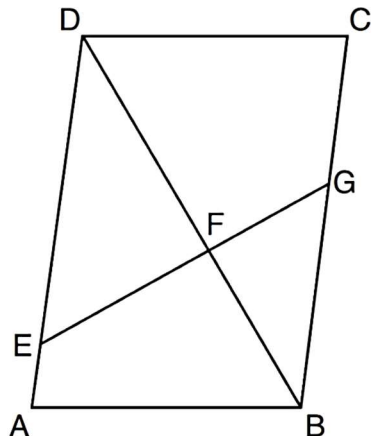
If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $\overline{ST}$?

(1) 5.6   (3) 11

(2) 8.75   (4) 15

June 2016

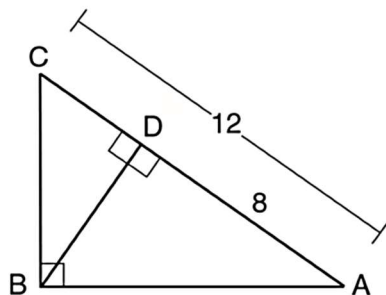**33** Given: Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$

Prove: $\triangle DEF \sim \triangle BGF$

SIMILARITY RELATED TOPICS

Right Triangle Altitude Problems

January 2018

23 In the diagram below of $\triangle ABC$, $\angle ABC$ is a right angle, $AC = 12$, $AD = 8$, and altitude $\overline{BD}$ is drawn.

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

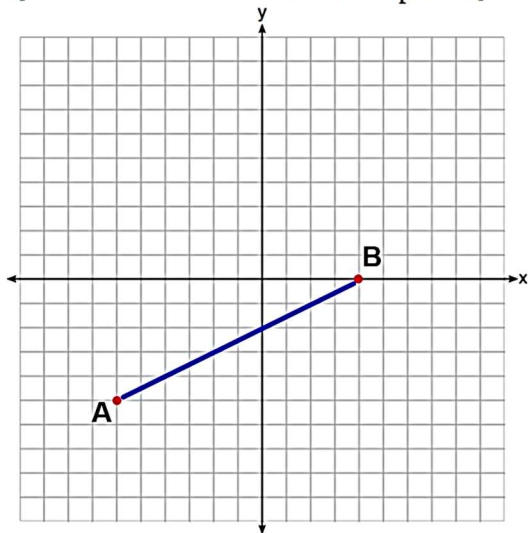(1) $4\sqrt{2}$ (3) $4\sqrt{5}$

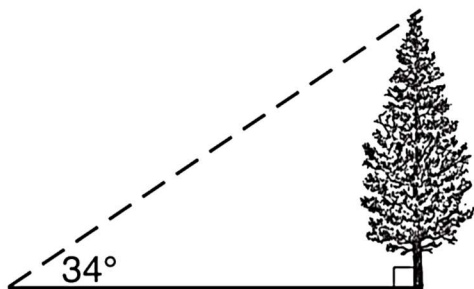(2) $4\sqrt{3}$ (4) $4\sqrt{6}$

June 2015

27 The coordinates of the endpoints of $\overline{AB}$ are $A(-6,-5)$ and $B(4,0)$. Point P is on $\overline{AB}$. Determine and state the coordinates of point P, such that $AP:PB$ is 2:3.
[The use of the set of axes below is optional.]

TRIGONOMETRY

June 2015

5 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.

If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?

(1) 29.7   (3) 13.5

(2) 16.6   (4) 11.2

January 2016

9 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?

(1) $\tan \angle A = \tan \angle B$ (3) $\cos \angle A = \tan \angle B$

(2) $\sin \angle A = \sin \angle B$ (4) $\sin \angle A = \cos \angle B$

January 2016

**16** In the diagram of right triangle ABC shown below, $AB = 14$ and $AC = 9$.
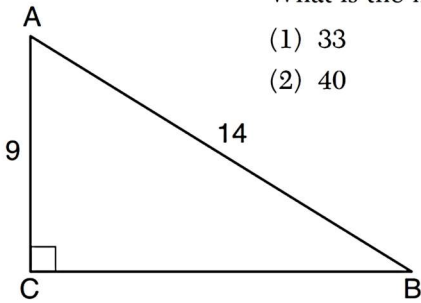
What is the measure of $\angle A$, to the *nearest degree*?

(1) 33   (3) 50

(2) 40   (4) 57

August 2015

32 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7°. A short time later, at point D, the angle of elevation was 16°.
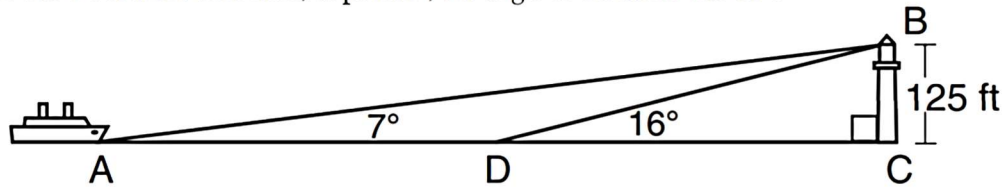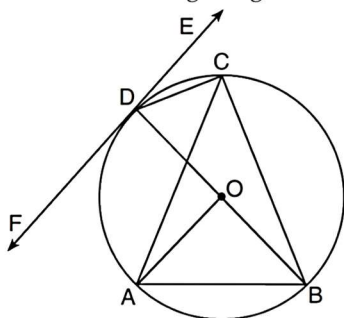
To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

CIRCLES

January 2016

21 In the diagram below, $\overline{DC}$, $\overline{AC}$, $\overline{DOB}$, $\overline{CB}$, and $\overline{AB}$ are chords of circle O, $\overleftrightarrow{FDE}$ is tangent at point D, and radius $\overline{AO}$ is drawn. Sam decides to apply this theorem to the diagram: "An angle inscribed in a semi-circle is a right angle."
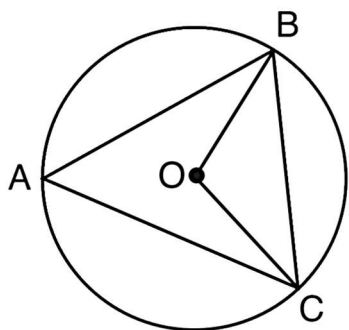
Which angle is Sam referring to?

(1) $\angle AOB$ (3) $\angle DCB$

(2) $\angle BAC$ (4) $\angle FDB$

June 2016

10 In the diagram below of circle O, $\overline{OB}$ and $\overline{OC}$ are radii, and chords $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are drawn.
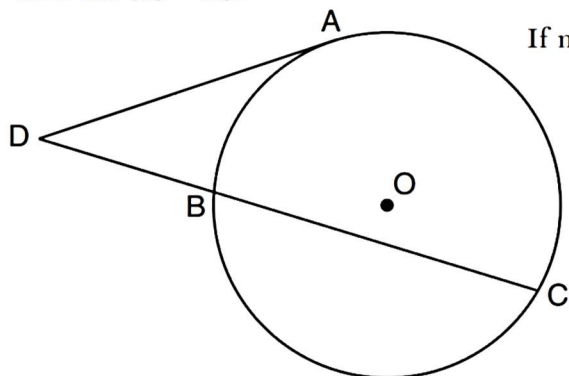
Which statement must always be true?

(1) $\angle BAC \cong \angle BOC$

(2) $m\angle BAC = \frac{1}{2} m\angle BOC$

(3) $\triangle BAC$ and $\triangle BOC$ are isosceles.

(4) The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

January 2017

28 In the diagram below, tangent $\overline{DA}$ and secant $\overline{DBC}$ are drawn to circle O from external point D, such that $\overset{\frown}{AC} \cong \overset{\frown}{BC}$.

If $m\overset{\frown}{BC} = 152°$, determine and state $m\angle D$.

August 2015

9 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is

(1) 25   (3) 5

(2) 16   (4) 4

June 2015

14 The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?

(1) center (0,3) and radius 4

(2) center (0,−3) and radius 4

(3) center (0,3) and radius 16
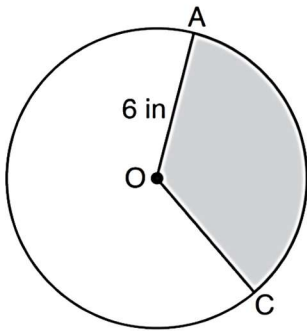
(4) center (0,−3) and radius 16

June 2016

24 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures 60°?

(1) $\dfrac{8\pi}{3}$

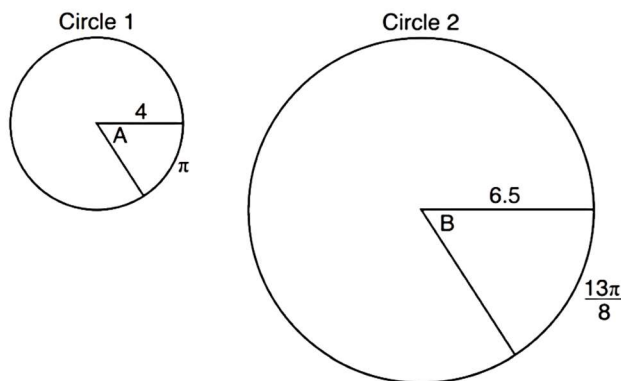(3) $\dfrac{32\pi}{3}$

(2) $\dfrac{16\pi}{3}$

(4) $\dfrac{64\pi}{3}$

June 2015

29 In the diagram below of circle O, the area of the shaded sector AOC is 12π in^2 and the length of $\overline{OA}$ is 6 inches. Determine and state m$\angle AOC$.

June 2016

29 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π, and angle B intercepts an arc of length $\dfrac{13\pi}{8}$.
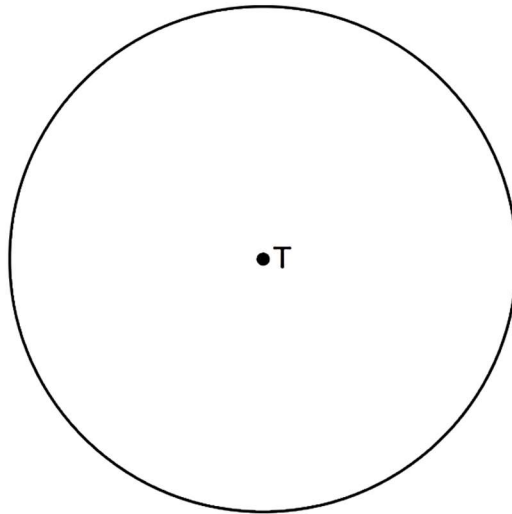

Dominic thinks that angles A and B have the same radian measure. State whether Dominic is correct or not. Explain why.

June 2015

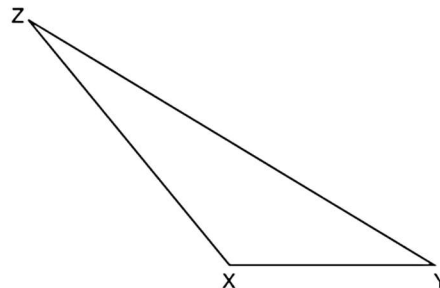**25** Use a compass and straightedge to construct an inscribed square in circle T shown below. [Leave all construction marks.]

•T

January 2016

34 Triangle XYZ is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.]

Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle XYZ$.
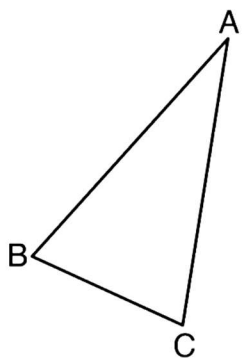
June 2016

31 In the diagram below, radius $\overline{OA}$ is drawn in circle O. Using a compass and a straightedge, construct a line tangent to circle O at point A. [Leave all construction marks.]
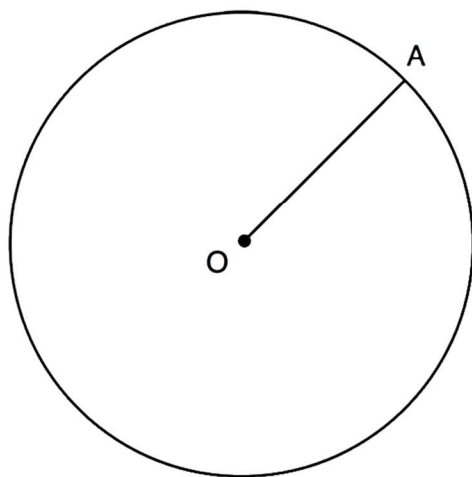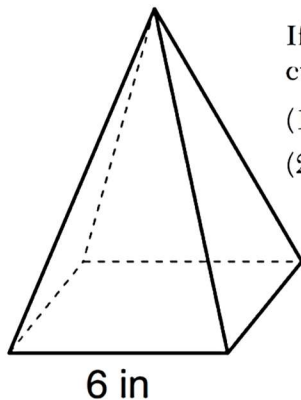
August 2016

32 Using a compass and straightedge, construct and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation with a scale factor of 2 and centered at B. [Leave all construction marks.]

January 2016

7 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.

If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is

(1) 72   (3) 288

(2) 144   (4) 432

Pyramid	$V = \dfrac{1}{3}Bh$

6 in

January 2017

11 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.

(1) 19   (3) 93

(2) 77   (4) 96

4 in   1 in.

4 in   6 in
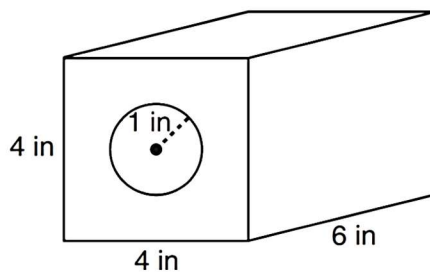
What is the approximate volume of the remaining solid, in cubic inches?

January 2018

33 A storage tank is in the shape of a cylinder with a hemisphere on the top. The highest point on the inside of the storage tank is 13 meters above the floor of the storage tank, and the diameter inside the cylinder is 8 meters. Determine and state, to the *nearest cubic meter,* the total volume inside the storage tank.
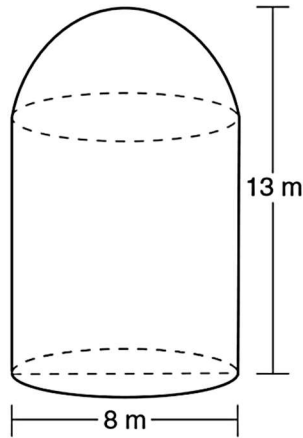
| Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$

13 m

8 m

June 2015

7 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?

(1) 1,632

(2) 408

(3) 102

(4) 92

January 2016

30 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish *A* has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish *B* has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.

B

A

72,000

40,000

51 mm

75 mm
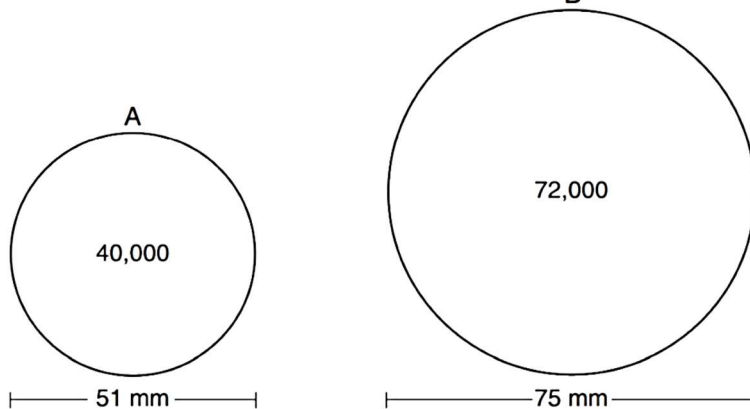
Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.