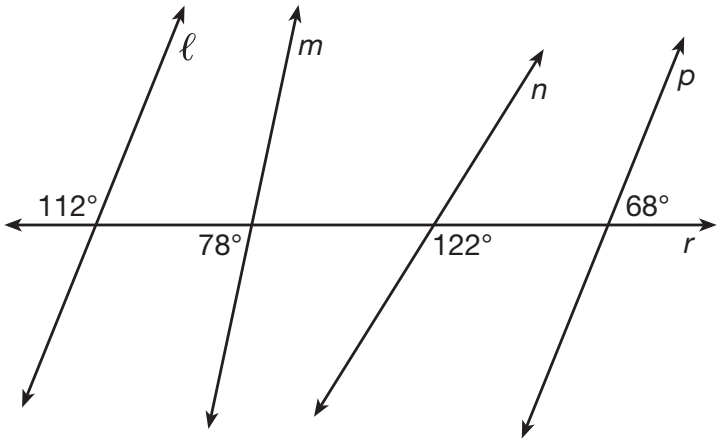
Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

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



Which statement is true?

(1) $\ell \parallel n$

(2) $\ell \parallel p$

(3) $m \parallel p$

(4) $m \parallel n$

2 Which transformation would *not* always produce an image that would be congruent to the original figure?

(1) translation

(2) dilation

(3) rotation

(4) reflection

3 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?

(1) cone

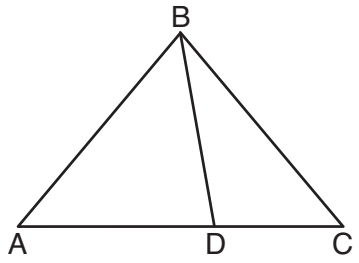
(2) pyramid

(3) prism

(4) sphere

Use this space for computations.

4 In the diagram below, m∠BDC = 100°, m∠A = 50°, and m∠DBC = 30°.



Which statement is true?

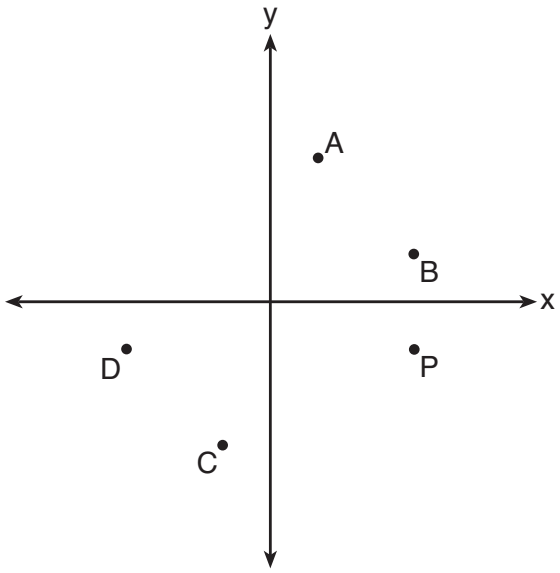
(1) △ABD is obtuse.

(2) △ABC is isosceles.

(3) m∠ABD = 80°

(4) △ABD is scalene.

5 Which point shown in the graph below is the image of point P after a counterclockwise rotation of 90° about the origin?



(1) A

(2) B

(3) C

(4) D

Use this space for computations.

6 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \frac{\sqrt{21}}{5}$. What is $\sin B$?

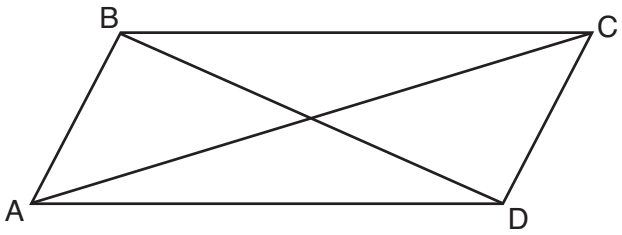
(1) $\frac{\sqrt{21}}{5}$

(2) $\frac{\sqrt{21}}{2}$

(3) $\frac{2}{5}$

(4) $\frac{5}{\sqrt{21}}$

7 Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.



Which information is *not* enough to prove $ABCD$ is a parallelogram?

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

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

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

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

8 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?

(1) 10.0

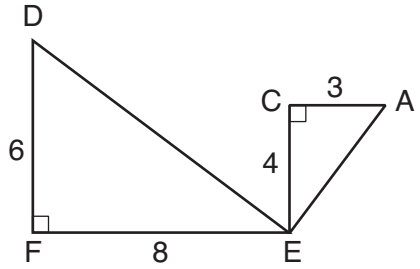
(2) 11.5

(3) 17.3

(4) 23.1

Use this space for computations.

9 Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$



What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?

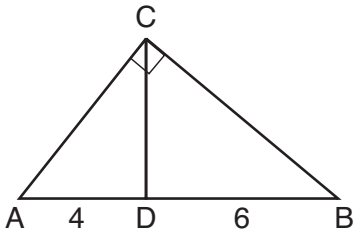
(1) a rotation of 180 degrees about point E followed by a horizontal translation

(2) a counterclockwise rotation of 90 degrees about point E followed by a horizontal translation

(3) a rotation of 180 degrees about point E followed by a dilation with a scale factor of 2 centered at point E

(4) a counterclockwise rotation of 90 degrees about point E followed by a dilation with a scale factor of 2 centered at point E

10 In the diagram of right triangle ABC, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at D.



If $AD = 4$ and $DB = 6$, which length of $\overline{AC}$ makes $\overline{CD} \perp \overline{AB}$?

(1) $2\sqrt{6}$

(2) $2\sqrt{10}$

(3) $2\sqrt{15}$

(4) $4\sqrt{2}$

Use this space for computations.

11 Segment CD is the perpendicular bisector of $\overline{AB}$ at E. Which pair of segments does *not* have to be congruent?

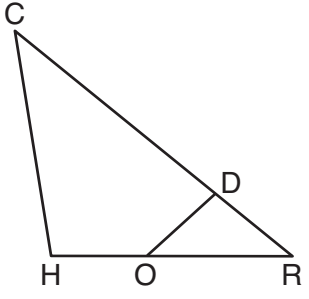
(1) $\overline{AD}, \overline{BD}$

(2) $\overline{AC}, \overline{BC}$

(3) $\overline{AE}, \overline{BE}$

(4) $\overline{DE}, \overline{CE}$

12 In triangle CHR, O is on $\overline{HR}$, and D is on $\overline{CR}$ so that $\angle H \cong \angle RDO$.



If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $\overline{CD}$?

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

(2) $6\frac{2}{3}$

(3) 11

(4) 15

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High School Math Reference Sheet

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilogram
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallon
1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

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