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 On the set of axes below, triangle *ABC* is graphed. Triangles $A'B'C'$ and $A''B''C''$, the images of triangle *ABC*, are graphed after a sequence of rigid motions.
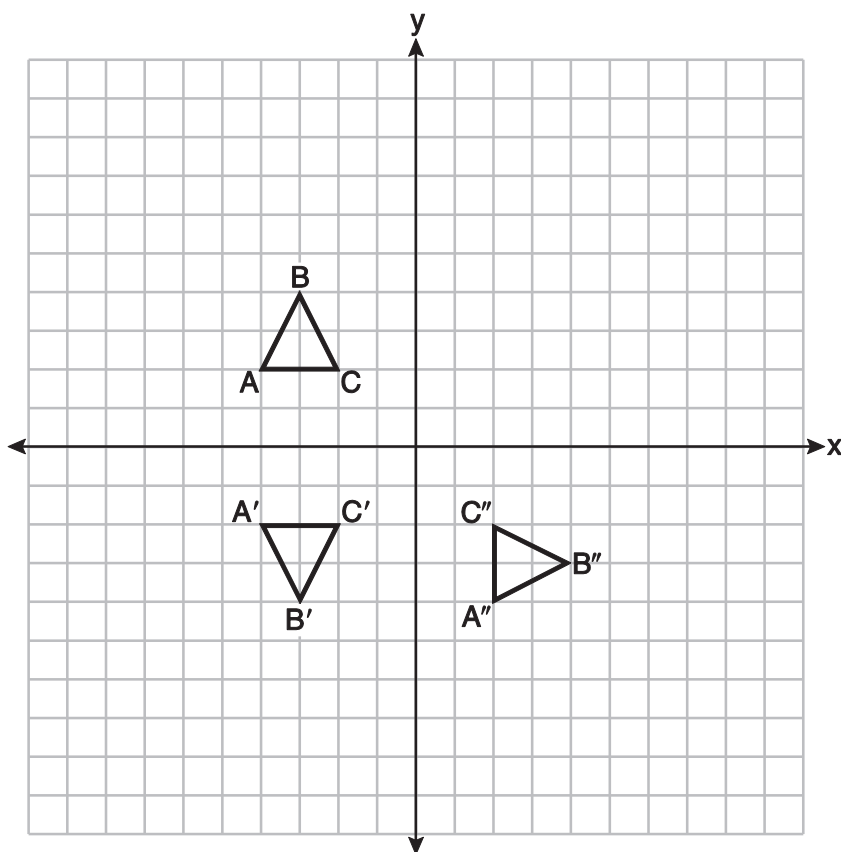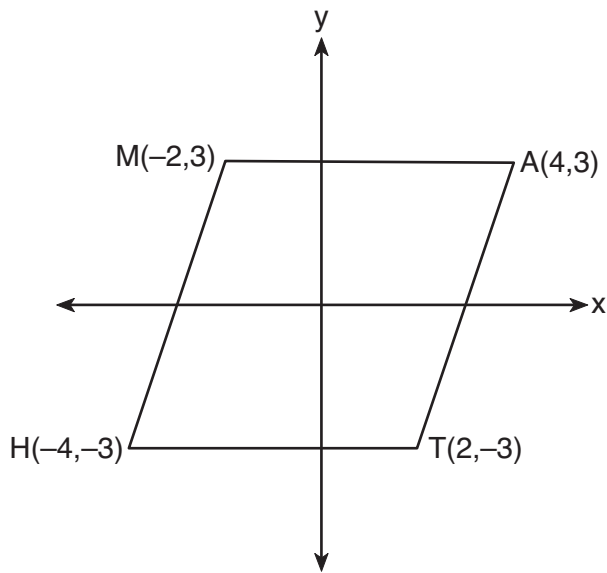

Identify which sequence of rigid motions maps $\triangle ABC$ onto $\triangle A'B'C'$ and then maps $\triangle A'B'C'$ onto $\triangle A''B''C''$.

(1) a rotation followed by another rotation

(2) a translation followed by a reflection

(3) a reflection followed by a translation

(4) a reflection followed by a rotation

4 Which transformation carries the parallelogram below onto itself?

(1) a reflection over $y = x$

(2) a reflection over $y = -x$

(3) a rotation of 90° counterclockwise about the origin

(4) a rotation of 180° counterclockwise about the origin

5 After a dilation centered at the origin, the image of $\overline{CD}$ is $\overline{C'D'}$. If the coordinates of the endpoints of these segments are $C(6,-4)$, $D(2,-8)$, $C'(9,-6)$, and $D'(3,-12)$, the scale factor of the dilation is

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

(3) 3

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

(4) $\dfrac{1}{3}$

Part II

Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil.   [14]
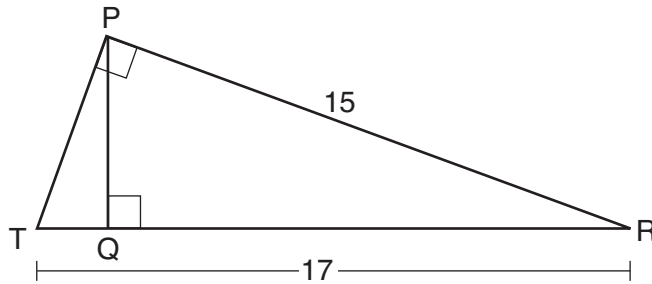
25 Triangle $A'B'C'$ is the image of triangle ABC after a dilation with a scale factor of $\frac{1}{2}$ and centered at point A. Is triangle ABC congruent to triangle $A'B'C'$? Explain your answer.

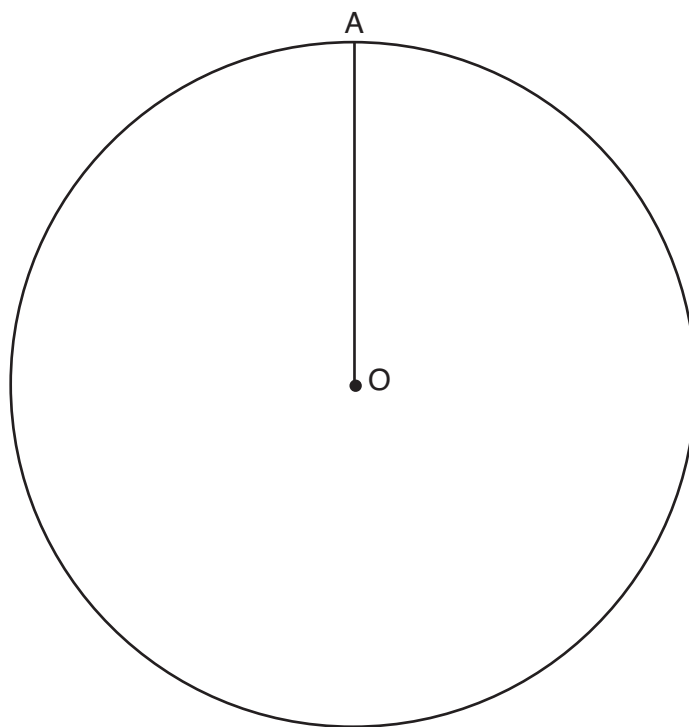**29** On the set of axes below, $\triangle ABC \cong \triangle STU$.
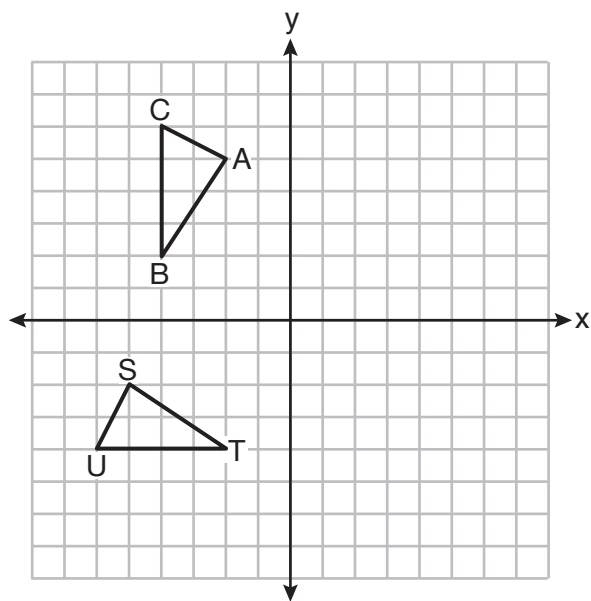
Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle STU$.

30 In right triangle PRT, m$\angle P = 90°$, altitude $\overline{PQ}$ is drawn to hypotenuse $\overline{RT}$, $RT = 17$, and $PR = 15$.

Determine and state, to the *nearest tenth*, the length of $\overline{RQ}$.
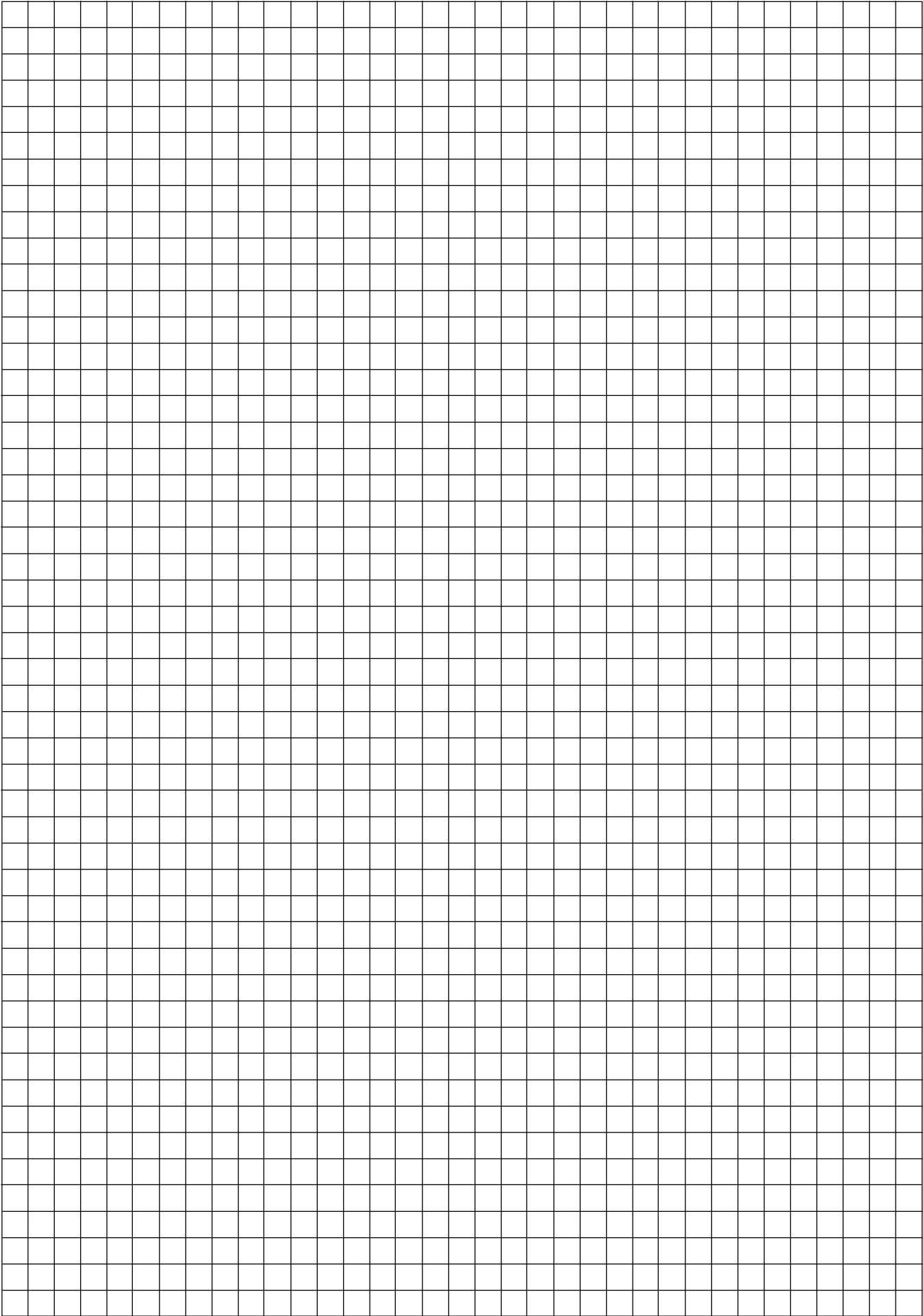
31 Given circle O with radius $\overline{OA}$, use a compass and straightedge to construct an equilateral triangle inscribed in circle O. [Leave all construction marks.]
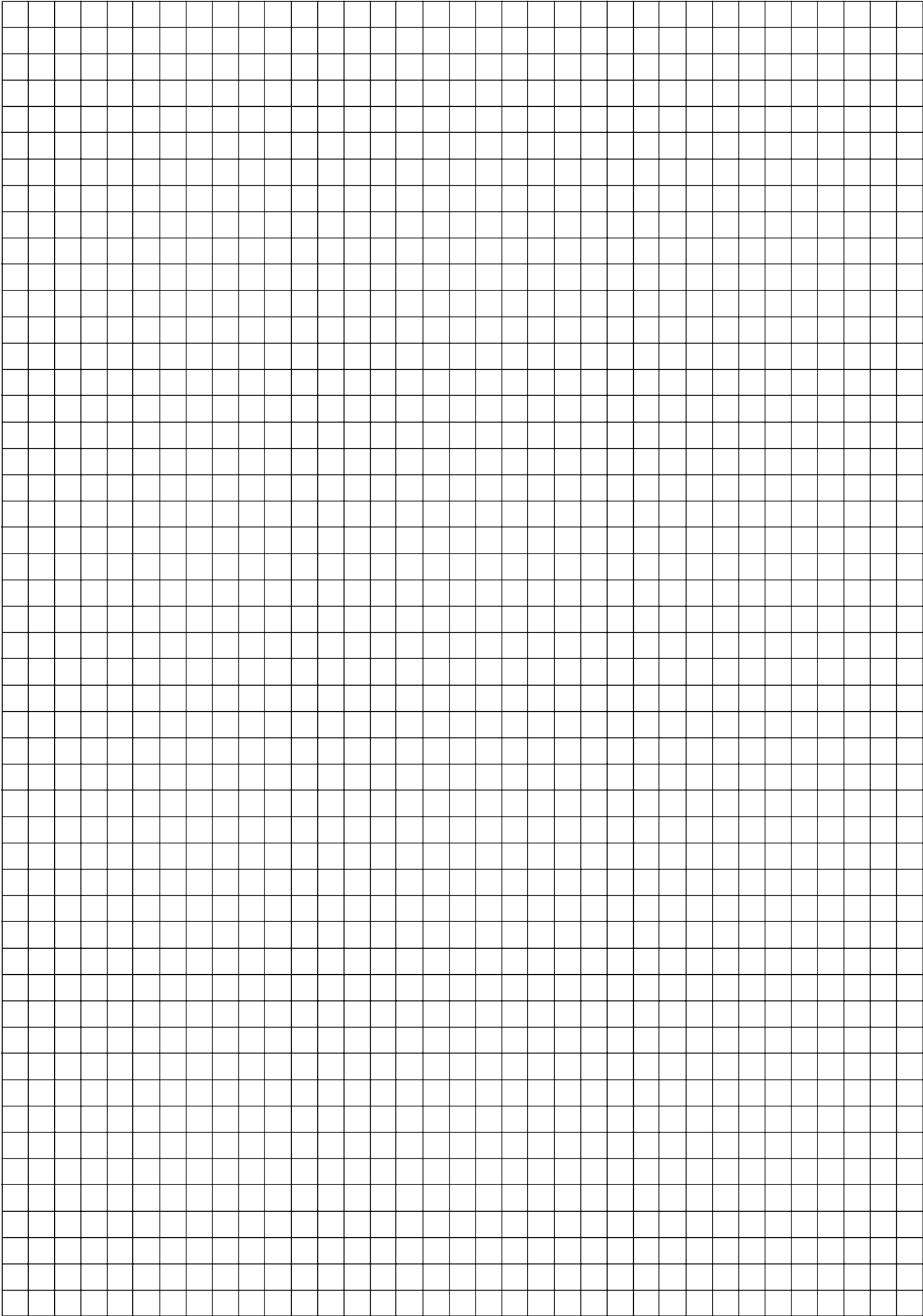
High School Math Reference Sheet

1 inch = 2.54 centimeters   1 kilometer = 0.62 mile   1 cup = 8 fluid ounces
1 meter = 39.37 inches   1 pound = 16 ounces   1 pint = 2 cups
1 mile = 5280 feet   1 pound = 0.454 kilogram   1 quart = 2 pints
1 mile = 1760 yards   1 kilogram = 2.2 pounds   1 gallon = 4 quarts
1 mile = 1.609 kilometers   1 ton = 2000 pounds   1 gallon = 3.785 liters
   1 liter = 0.264 gallon
   1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$	Pythagorean Theorem	$a^2 + b^2 = c^2$
Parallelogram	$A = bh$	Quadratic Formula	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circle	$A = \pi r^2$	Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Circle	$C = \pi d \text{ or } C = 2\pi r$	Geometric Sequence	$a_n = a_1 r^{n-1}$
General Prisms	$V = Bh$	Geometric Series	$S_n = \dfrac{a_1 - a_1 r^n}{1 - r} \text{ where } r \neq 1$
Cylinder	$V = \pi r^2 h$	Radians	$1 \text{ radian} = \dfrac{180}{\pi} \text{ degrees}$
Sphere	$V = \frac{4}{3}\pi r^3$	Degrees	$1 \text{ degree} = \dfrac{\pi}{180} \text{ radians}$
Cone	$V = \frac{1}{3}\pi r^2 h$	Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$
Pyramid	$V = \frac{1}{3}Bh$		

Tear Here

Tear Here

Tear Here

13 In the diagram below of circle O, chords $\overline{JT}$ and $\overline{ER}$ intersect at M.
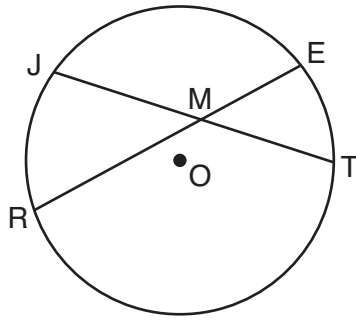
If $EM = 8$ and $RM = 15$, the lengths of $\overline{JM}$ and $\overline{TM}$ could be

(1) 12 and 9.5   (3) 16 and 7.5

(2) 14 and 8.5   (4) 18 and 6.5

14 Triangles JOE and SAM are drawn such that $\angle E \cong \angle M$ and $\overline{EJ} \cong \overline{MS}$. Which mapping would *not* always lead to $\triangle JOE \cong \triangle SAM$?

(1) $\angle J$ maps onto $\angle S$ (3) $\overline{EO}$ maps onto $\overline{MA}$

(2) $\angle O$ maps onto $\angle A$ (4) $\overline{JO}$ maps onto $\overline{SA}$

15 In $\triangle ABC$ shown below, $\angle ACB$ is a right angle, E is a point on $\overline{AC}$, and $\overline{ED}$ is drawn perpendicular to hypotenuse $\overline{AB}$.
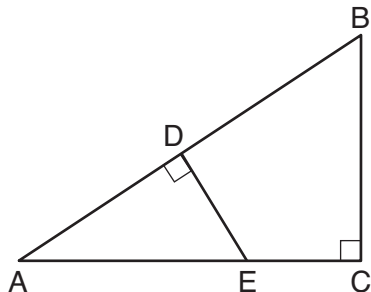
If $AB = 9$, $BC = 6$, and $DE = 4$, what is the length of $\overline{AE}$?

(1) 5   (3) 7

(2) 6   (4) 8