End of Course

ntroducing the

Virginia Standards of Learning

The complete set of items that appeared on the Spring 2000 Standards of Learning test taken by most public school students in Virginia is presented in the following pages. The intent of this release of these test questions is to provide parents and teachers additional information to accompany the Student Performance Report and/or the Parent Report.

The information accompanying each test question is broken into several components:

Reporting Category: Matches the score report and allows for identification of strengths and weaknesses indicated by student scores.

Standard of Learning: Presents the SOL used in developing the assessment question.

Builds On: Indicates what the student has studied in previous course work.

Instruction: Provides information for teachers to use as the SOL is incorporated into instruction.

The answer to each question can be found in the back of the booklet.

Virginia
Standards of Learning Assessments

Geometry

End of Course

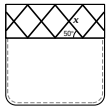
Reporting Category: Lines and Angles

A. Standard of Learning: G.3 The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.

Builds On: Students begin studying angles in the grade 3 SOL and progress in complexity of the relationships studied through grade 8 SOL.

A

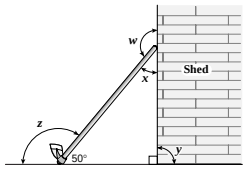
1



A design made with parallel lines is sewn on a pocket of a shirt as shown. What is the value of *x*?

A 50°
B 80°
C 100°
D 130°

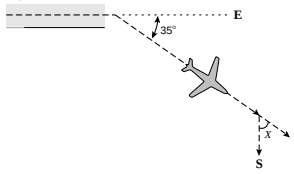
2 **A gardener rested his hoe against a shed. The hoe made a 50° angle with the ground as shown in the diagram below.**



Which represents the supplement to the 50° angle?

F *w*
G *x*
H *y*
J *z*

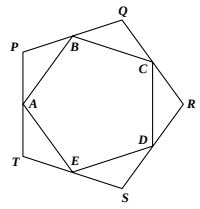
3



An airplane leaves a runway heading due east then turns 35° to the right as shown in the figure. How much more will the airplane have to turn to be heading due south?

A 10°
B 45°
C 55°
D 65°

4



Regular pentagon *ABCDE* is formed by joining the midpoints of the sides of regular pentagon *PQRST*.

What is the measure of ∠*PAB*?

F 30°
G 36°
H 60°
J 72°

Instruction: Provide students an opportunity to analyze a diagram in a problem situation requiring the application of knowledge of complementary and supplementary angles; to solve problems with angles in regular polygons; and to determine measurements of angles formed by parallel lines being cut by a transversal.

Geometry

End of Course

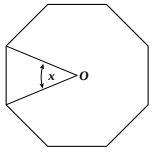
Reporting Category: Lines and Angles

A. Standard of Learning: G.3 The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.

Builds On: Students begin studying angles in the grade 3 SOL and progress in complexity of the relationships studied through grade 8 SOL.

A

5



The polygon in the drawing is a regular octagon with *O* as its center. What is the value of *x*?

A 30°
B 45°
C 60°
D 72°

Instruction: Provide students an opportunity to analyze a diagram in a problem situation requiring the application of knowledge of complementary and supplementary angles; to solve problems with angles in regular polygons; and to determine measurements of angles formed by parallel lines being cut by a transversal.

Geometry

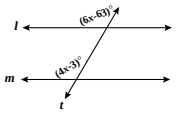
End of Course

A. Standard of Learning: G.4 The student will use the relationships between angles formed by two lines cut by a transversal to determine if two lines are parallel and verify, using algebraic and coordinate methods as well as deductive proofs.

Builds On: Students begin to study the concept of parallelism in the grade 4 SOL and progress in difficulty of concepts through the eighth grade SOL.

A

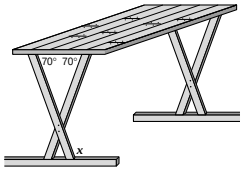
6



Line *l* is parallel to line *m* when the value of *x* is —

F 3
G 12
H 30
J 38

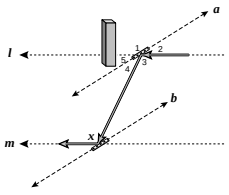
7



The diagram shows a table being constructed. If the leg piece forms a 70° angle with the top of the table, what must be the value of *x* so that the top of the table is parallel to the floor?

A 40°
B 70°
C 90°
D 110°

8 **This drawing shows an apparatus designed to divert light rays around an obstacle.**



Lines *a* and *b* are parallel and angles 2 and 4 each measure 32°. If lines *l* and *m* need to be parallel, what must be the value of *x*?

F 32°
G 64°
H 116°
J 148°

Instruction: Provide students with an opportunity to analyze diagrams in problem situations and apply the relationships of angles to determine if lines are parallel.

Geometry

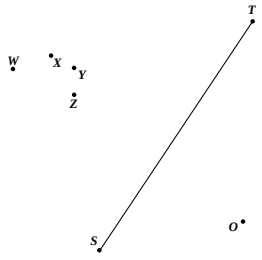
End of Course

A. Standard of Learning: G.11 The student will construct, using a compass and straightedge, a line segment congruent to a given line segment, the bisector of a line segment, a perpendicular to a given line from a point not on the line, a perpendicular to a given line at a point on the line, the bisector of a given angle, and an angle congruent to a given angle.

Builds On: Students begin drawing representations of figures in grade 3 SOL and move into constructions in the grades 6, 7, and 8 SOL.

A

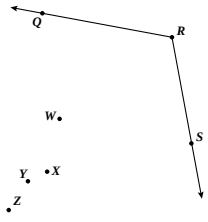
9 **Use your compass and straightedge to construct a line that is perpendicular to $\overleftrightarrow{ST}$ and passes through point *O*.**



Which other point lies on this perpendicular?

A *W*
B *X*
C *Y*
D *Z*

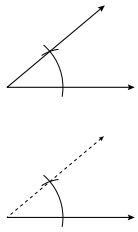
10 **Use your compass and straightedge to construct the bisector of $\angle QRS$.**



Which point lies on this bisector?

F *W*
G *X*
H *Y*
J *Z*

11



The drawing shows a compass and straightedge construction of —

A a line segment congruent to a given line segment
B the bisector of a line segment
C the bisector of a given angle
D an angle congruent to a given angle

Instruction: Provide students with an opportunity to identify what construction is modeled in a diagram; to do a construction and determine through which points a construction passes.

Geometry

End of Course

Reporting Category: Triangles and Logic

A. Standard of Learning: G.1.a The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include identifying the converse, inverse, and contrapositive of a conditional statement.

Builds On: Students begin to use reasoning skills in Kindergarten SOL. The complexity of the situations and the need for justification increase through the grade 8 SOL.

A

12 **Which is the inverse of the sentence, "If Sam leaves, then I will stay."?**

F If I stay, then Sam will leave.
G If Sam does not leave, then I will not stay.
H If Sam leaves, then I will not stay.
J If I do not stay, then Sam will not leave.

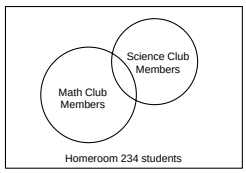
Instruction: Provide students an opportunity to determine the inverse of a statement.

B. Standard of Learning: G.1.c The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include diagramming arguments involving quantifiers (all, no, none, some), using Venn diagrams.

Builds On: Students begin to use reasoning skills in Kindergarten SOL. The complexity of the situations and the need for justification increase through the grade 8 SOL.

B

13



According to the diagram, which of the following is true?

A All students in homeroom 234 belong to either the Math Club or the Science Club.
B All students in homeroom 234 belong to both the Math Club and the Science Club.
C No student in homeroom 234 belongs to both the Math Club and the Science Club.
D Some students in homeroom 234 belong to both the Math Club and the Science Club.

Instruction: Provide students an opportunity to analyze information presented in a Venn diagram.

Geometry

End of Course

A. Standard of Learning: G.5.a The student will investigate and identify congruence and similarity relationships between triangles.

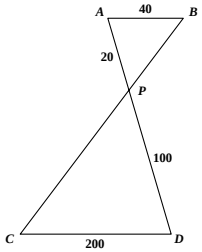
Builds On: Students begin studying the concepts of congruence and similarity in the grade 6 SOL.

B. Standard of Learning: G.5.b The student will prove two triangles are congruent or similar given information in the form of a figure or statement, using algebraic and coordinate as well as deductive proofs.

Builds On: Students begin studying the concepts of congruence and similarity in the grade 6 SOL.

A

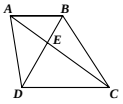
14 $\overline{AB} \parallel \overline{CD}$



Which relationship is true about ΔAPB and ΔDPC?

F They are congruent.
G They are similar.
H They are equal in area.
J They are equal in perimeter.

15



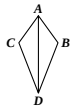
In quadrilateral *ABCD*, $\overline{AB}$ is parallel to $\overline{DC}$ and the diagonals intersect at *E*. Which statement is true?

A No triangles in the figure are similar.
B ΔADE is similar to ΔBCE.
C ΔABD is similar to ΔABC.
D ΔABE is similar to ΔCDE.

Instruction: Provide students an opportunity to identify similar triangles based on measurements in a diagram; and to determine that two triangles are similar from information given in a statement.

B

16 **Given:** $\overline{AC} \cong \overline{AB}$
$\overline{DC} \cong \overline{DB}$



Which could be used to prove $\Delta ABD \cong \Delta ACD$?

F (SSS) If 3 sides of one triangle are congruent to 3 sides of another triangle, then the triangles are congruent.

G (SAS) If 2 sides and the angle between them in one triangle are congruent to 2 sides and the angle between them in another triangle, then the triangles are congruent.

H (ASA) If 2 angles and the side between them of one triangle are congruent to 2 angles and the side between them of another triangle, then the triangles are congruent.

J (AAS) If 2 angles and a side not between them are congruent to 2 angles and a side not between them of another triangle, then the triangles are congruent.

Instruction: Provide students an opportunity to determine the appropriate postulate or theorem that proves two triangles congruent.

Geometry

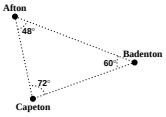
End of Course

A. Standard of Learning: G.6 The student, given information concerning the lengths of sides and/or measures of angles, will apply the triangle inequality properties to determine whether a triangle exists and to order sides and angles. These concepts will be considered in the context of practical situations.

Builds On: Students begin to study triangles in the Kindergarten SOL and progress in complexity through the grade 8 SOL.

A

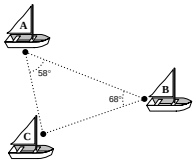
17 Afton



Three towns form a triangle on a map. The angle formed at the point designating Afton is 48°, at Badenton 60°, and at Capeton 72°. Which lists the distances between towns in order, *greatest* to *least*?

A Afton to Badenton, Badenton to Capeton, Afton to Capeton
B Afton to Badenton, Afton to Capeton, Badenton to Capeton
C Afton to Capeton, Afton to Badenton, Badenton to Capeton
D Badenton to Capeton, Afton to Badenton, Afton to Capeton

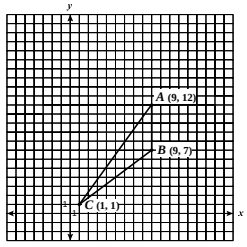
18



Three boats are anchored in a bay. Given the information in the diagram, which of the following statements concerning the distances between the boats is true?

F $AC < AB$
G $BC < AB$
H $AB < AC$
J $AC < BC$

19



Erica plotted the 3 towns closest to her house on a graph with town *A* at (9, 12), town *B* at (9, 7) and town *C* at (1, 1). She drew the triangle joining the 3 points. Which lists the angles formed in size, smallest to largest?

A $\angle A, \angle B, \angle C$
B $\angle B, \angle C, \angle A$
C $\angle C, \angle A, \angle B$
D $\angle B, \angle A, \angle C$

Instruction: Provide students an opportunity to view a graph of a triangle and determine the relative size of the angles; to determine the relationship of sides of a triangle by analyzing a diagram; and to order the distances between points based on a triangular arrangement and angle values.

Geometry

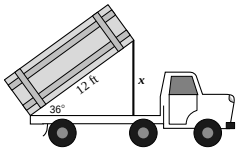
End of Course

A. Standard of Learning: G.7 The student will solve practical problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry. Calculators will be used to solve problems and find decimal approximations for the solutions.

Builds On: Students begin working with right triangles in the grade 5 SOL, and work with the Pythagorean Theorem begins in the grade 8 SOL.

A

20

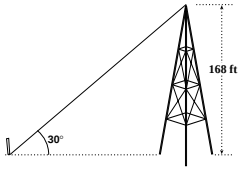


The 12-foot bed of a dump truck loaded with heavy stone must rise to an angle of 36° before the stone will spill out. Approximately how high must the front of the bed rise (*x*) to unload?

sin 36° ≈ 0.588 cos 36° ≈ 0.810
tan 36° ≈ 0.727

F 6 ft
G 7 ft
H 9 ft
J 10 ft

21

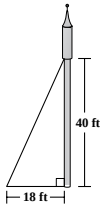


The angle from a point on the ground to the top of a 168-foot tower is 30°. About how long is a wire that reaches from the top of the tower to the point on the ground?

sin 30° ≈ 0.5 cos 30° ≈ 0.8666
tan 30° ≈ 0.577

A 146 ft
B 194 ft
C 291 ft
D 336 ft

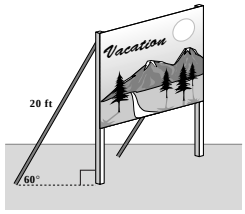
22 **From a point 18 feet from the base of a tower, a wire is stretched to an attachment 40 feet up the tower.**



To the *nearest* foot, how long is the wire?

F 58 ft
G 44 ft
H 36 ft
J 29 ft

23



A billboard is supported by 20-foot lengths of tubing at an angle of 60°. How far from the base of the billboard is the bottom end of the brace?

A 5 ft
B 8.7 ft
C 10 ft
D 17.3 ft

Instruction: Provide students an opportunity to apply the properties of 30-60-90 right triangles to problems; to solve problems using right triangle trigonometry; and to apply the Pythagorean Theorem.

Geometry

End of Course

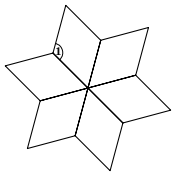
Reporting Category: Polygons and Circles

A. Standard of Learning: G.8.a The student will investigate and identify properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles, and diagonals.

Builds On: Students begin studying the characteristics of quadrilaterals in the grade 1 SOL continuing in complexity through the grade 8 SOL.

A

24



The design for a quilt piece is made up of 6 congruent parallelograms. What is the measure of ∠1?

F 30°
G 60°
H 120°
J 150°

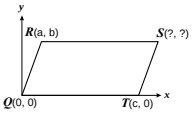
Instruction: Provide students an opportunity to determine the angle measures of a parallelogram in a complex diagram.

B. Standard of Learning: G.8.b The student will prove these properties of quadrilaterals using algebraic and coordinate as well as deductive proofs.

Builds On: Students begin studying the characteristics of quadrilaterals in the grade 1 SOL continuing in complexity through the grade 8 SOL.

B

25 ***QRST* is a parallelogram.**



What are the coordinates of vertex *S*?

A (c, b)
B $(a + b, c)$
C $(c - a, b)$
D $(c + a, b)$

Instruction: Provide students an opportunity to determine the coordinates of the fourth vertex of a quadrilateral when the coordinates are variables.

Geometry

End of Course

A. Standard of Learning: G.8.c The student will use properties of quadrilaterals to solve practical problems.

Builds On: Students begin studying the characteristics of quadrilaterals in the grade 1 SOL continuing in complexity through the grade 8 SOL.

A

26

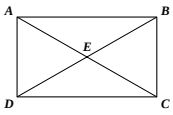


Figure *ABCD* is a rectangle. $\overline{AC}$ and $\overline{BD}$ are diagonals. $AC = 25$ meters and $BC = 15$ meters. What is the length of $\overline{DE}$?

F 10 m
G 12.5 m
H 13.5 m
J 15 m

Instruction: Provide students an opportunity to apply the properties of rectangles to solve problems.

Geometry

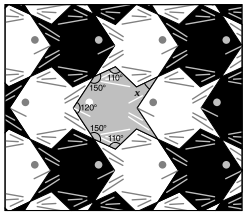
End of Course

A. Standard of Learning: G.9 The student will use measures of interior and exterior angles of polygons to solve problems. Tessellations and tiling problems will be used to make connections to art, construction, and nature.

Builds On: Students begin studying interior and exterior angles and tesslation in the Kindergarten SOL increasing in complexity through the grade 8 SOL.

A

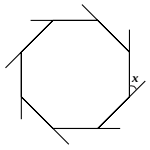
27 **Some of the angle measures are given for one of the fish-shaped polygons in this tessellation.**



What is the value of *x*?

A 60°
B 45°
C 40°
D 30°

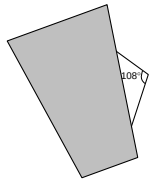
28 **The figure is a regular octagon with each side extended.**



What is the value of *x*?

F 45°
G 60°
H 75°
J 135°

29 **In the drawing, a *regular* polygon is partially covered by the trapezoid.**



How many sides does the covered polygon have?

A 4
B 5
C 6
D 8

Instruction: Provide students an opportunity to apply knowledge of the interior angles of a regular polygon; to apply knowledge of angle relationships to tessellations; and to determine an exterior angle of a regular polygon.

Geometry

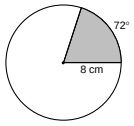
End of Course

A. Standard of Learning: G.10 The student will investigate and use the properties of angles, arcs, chords, tangents, and secants to solve problems involving circles. Problems will include finding the area of a sector and applications of architecture, art, and construction.

Builds On: Students begin to study circles in the Kindergarten SOL continuing in more complexity through the grade 8 SOL.

A

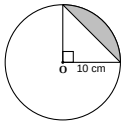
30



A circle has a radius of 8 centimeters. The measure of the arc of the shaded section is 72°. Which is *closest* to the area of the shaded section of the circle?

F 10.1 cm^2
G 40.2 cm^2
H 50.3 cm^2
J 160.8 cm^2

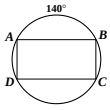
31 **Point O is the center of the circle.**



What is the area of the shaded portion of the circle?

A 28.5 cm^2
B 34.2 cm^2
C 50 cm^2
D 78.5 cm^2

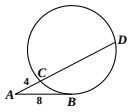
32



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°

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

Instruction: Provide students an opportunity to calculate the area of a piece of a sector of a circle; to calculate the area of a sector; to determine an arc measure; and to use the relationship between tangent and secant to solve problems.

Geometry

End of Course

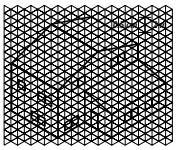
Reporting Category: Three-Dimensional Figures

A. Standard of Learning: G.12 The student will make a model of a three-dimensional figure from a two-dimensional drawing and make a two-dimensional representation of a three-dimensional object. Models and representations will include scale drawings, perspective drawings, blueprints, or computer simulations.

Builds On: Students begin work with three-dimensional figures in the grade 2 SOL increasing in complexity through the grade 8 SOL.

A

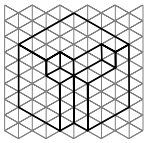
34 **This is an architect's scale drawing of a house that was built, where 0.5 cm represents 2 m.**



How tall is the house at its highest point?

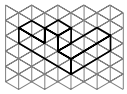
F 6 m
G 8 m
H 12 m
J 16 m

35

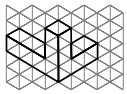


Which piece could complete this cube?

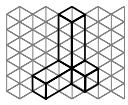
F



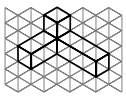
G



H



J



Instruction: Provide students an opportunity to complete a three-dimensional figure drawn on isometric graph paper; and to determine the actual height of a house when given the scale.

Geometry

End of Course

A. Standard of Learning: G.13 The student will use formulas for surface area and volume of three-dimensional objects to solve practical problems. Calculators will be used to find decimal approximations for results.

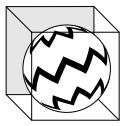
Builds On: Students begin studying volume in the grade 1 SOL and surface area in the grade 2 SOL, increasing in complexity through the grade 8 SOL.

A

36 **An aquarium tank is 3 feet long, 1 foot wide, and 2 feet high. How many gallons of water would it take to fill the tank two-thirds full? (A cubic foot is about 7.5 gallons)**

F 30
G 40
H 86
J 4,860

37



A sphere with a 2-inch radius is packed in a cube so that all sides touch. How much empty space is left in the cube?

A 17.8 cu in.
B 30.5 cu in.
C 33.5 cu in.
D 47.25 cu in.

Instruction: Provide students an opportunity to apply the skills for finding the volume of a rectangular solid to a problem situation; and to find the difference in volume between a sphere and the cube that encloses it.

Geometry

End of Course

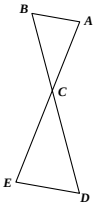
A. Standard of Learning: G.14 The student, given similar geometric objects, will use proportional reasoning to solve practical problems; investigate relationships between linear, square, and cubic measures; and describe how changes in one of the measures of the object affect the others.

Builds On: Students begin to study similarity in the grade 7 SOL and continue through the grade 8 SOL.

A

38 $AB \parallel DE$.

$AB = 6$
$AC = 9$
$BC = 10$
$CE = 12$



What is DE?

F 7.2
G 8
H 16
J 20

39 A cylindrical paint can has a capacity of one gallon. For another size can, the height is doubled. What is the capacity of the larger size?

A 2 gal.
B 4 gal.
C 8 gal.
D 16 gal.

Instruction: Provide students an opportunity to apply knowledge of proportional reasoning to find the missing length of a side of a triangle; and to solve cylindrical volume problems that have a change in height.

Geometry

End of Course

Reporting Category: Coordinate Relations, Transformations, and Vectors

A. Standard of Learning: G.2.a The student will use pictorial representations, including computer software and coordinate methods to solve problems involving symmetry and transformation. This will include using formulas for finding distance, midpoint, and slope.

Builds On: Students begin the study of the coordinate plane in the grade 5 SOL.

A

40 What is the slope of the line through (−2, 3) and (1, 1)?

F $-\frac{3}{2}$

G $-\frac{2}{3}$

H $\frac{1}{2}$

J 2

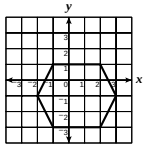
Instruction: Provide students an opportunity to determine the slope of a line given two points on the line.

B. Standard of Learning: G.2.b The student will use pictorial representations, including computer software and coordinate methods to solve problems involving symmetry and transformation. This will include investigating and determining whether a figure is symmetric with respect to a line or a point.

Builds On: Students begin the study of symmetry in the grade 2 SOL.

B

41



The hexagon in the drawing has a line of symmetry through —

A (−1, −3) and (2, 1)
B (1, 1) and (1, −3)
C (2, 3) and (2, −3)
D (−2, −1) and (3, −1)

Instruction: Provide students an opportunity to determine the coordinates for a line of symmetry on a graph.

Geometry

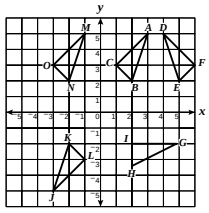
End of Course

A. Standard of Learning: G.2.c The student will use pictorial representations, including computer software and coordinate methods to solve problems involving symmetry and transformation. This will include determining whether a figure has been translated, reflected, or rotated.

Builds On: Students begin the study of transformations in the grade 8 SOL.

A

42



Which triangle is a 180° rotation about the origin of triangle *ABC*?

F Δ *DEF*
G Δ *GHI*
H Δ *JKL*
J Δ *MNO*

Instruction: Provide students an opportunity to determine a triangle rotated 180° on the coordinate plane.

B. Standard of Learning: G.15.a The student will draw a system of vectors and find the resultant graphically, write the components of a vector as a column matrix, and find the resultant by matrix addition.

Builds On: Students begin to study matrices in the grade 8 SOL.

B

43 If vector $\vec{v} + \begin{bmatrix} -3 \\ 2 \end{bmatrix} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$, then $\vec{v}$ =

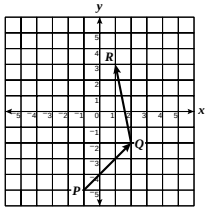
A $\begin{bmatrix} 2 \\ -2 \end{bmatrix}$

B $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$

C $\begin{bmatrix} 4 \\ -2 \end{bmatrix}$

D $\begin{bmatrix} -2 \\ 2 \end{bmatrix}$

44



Given the system of vectors $\overrightarrow{PQ}$ and $\overrightarrow{QR}$. Which of the following represents the resultant vector $\overrightarrow{PR}$?

F $\begin{bmatrix} -1 \\ 5 \end{bmatrix}$

G $\begin{bmatrix} -2 \\ 5 \end{bmatrix}$

H $\begin{bmatrix} 3 \\ 3 \end{bmatrix}$

J $\begin{bmatrix} 2 \\ 8 \end{bmatrix}$

Instruction: Provide students an opportunity to solve a vector equation applying matrix subtraction.

Geometry

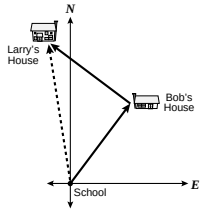
End of Course

A. Standard of Learning: G.15.b The student will solve practical problems using a system of vectors.

Builds On: Students begin to study matrices in the grade 8 SOL.

A

45 From school, Larry drove 3 miles east and 4 miles north to Bob's house. After dropping him off, he drove 4 miles west and 3 miles north to his home.



Which column matrix represents the resultant vector (in miles) of Larry's drive to his home from school?

A $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$

B $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$

C $\begin{bmatrix} 5 \\ 5 \end{bmatrix}$

D $\begin{bmatrix} -1 \\ 7 \end{bmatrix}$

Instruction: Provide students an opportunity to determine the resultant vector in column matrix form when given vectors on a graph and to solve a problem using a system of vectors.

Correct Answers

End of Course

GEOMETRY TEST

1. C **2.** J **3.** C **4.** G **5.** B **6.** H **7.** D **8.** H **9.** A **10.** H
11. D **12.** G **13.** D **14.** G **15.** D **16.** F **17.** B **18.** H **19.** C
20. G **21.** D **22.** G **23.** C **24.** H **25.** D **26.** G **27.** D
28. F **29.** B **30.** G **31.** A **32.** G **33.** B **34.** G **35.** J **36.** F
37. B **38.** G **39.** A **40.** G **41.** D **42.** H **43.** A **44.** J **45.** D