

2015 Fall Benchmark #3 – Analytical Geometry

1. What can be concluded from the statement $m\angle 1 + m\angle 2 = 180^\circ$? *MGSE9-12.G.CO.9 DOK 2*
- a. $\angle 1$ and $\angle 2$ are congruent
 - b. $\angle 1$ and $\angle 2$ are supplementary**
 - c. $\angle 1$ and $\angle 2$ are complementary
 - d. $\angle 1$ and $\angle 2$ form a linear pair

2. If $5 = 2k$, what justifies $2k = 5$? *MGSE9-12.G.CO.9 DOK 1*
- a. Multiplication Property of Equality
 - b. Division Property of Equality
 - c. Symmetric Property of Equality**
 - d. Reflexive Property of Equality

3. What is the measure of one of the base angles of an isosceles triangle if the measure of the vertex angle is 98° ? *MGSE9-12.G.CO.10 DOK 2*
- a. 1°
 - b. 2°
 - c. 41°**
 - d. 82°



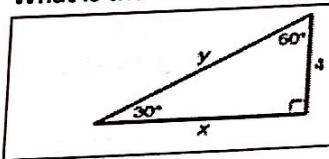
4. One angle of an equilateral triangle measures $(4x - 20)^\circ$. What is the value of x ? *MGSE9-12.G.CO.10 DOK 2*
- a. 2.5
 - b. 10
 - c. 12.5
 - d. 20**

$4x - 20 = 60$

5. The consecutive angles of a parallelogram measure $(x + 30)^\circ$ and $(4x)^\circ$. What is the measure of the smallest angle? *MGSE9-12.G.CO.11 DOK 3*
- a. 10°
 - b. 30°
 - c. 40°
 - d. 60°**

$x + 30 + 4x = 180$
 $5x = 150$
 $x = 30$

6. What is the value of y ? *MGSE9-12.G.SRT.6 DOK 2*

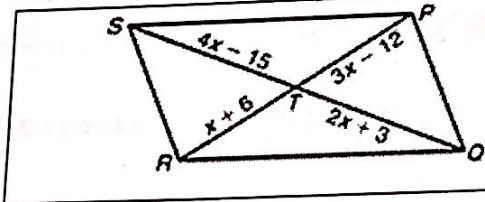


- a. $3\sqrt{4}$
- b. $4\sqrt{3}$
- c. 4
- d. 8**

7. A regular octagon has an apothem of 4 cm. What is its approximate area? *MGSE9-12.G.GMD.1 DOK 3*

- a. 16 cm^2
- b. 76.8 cm^2
- c. 27.2 cm^2
- d. 53 cm^2

8. PQRS is a parallelogram. Find x . *MGSE9-12.G.CO.11 DOK 2*



- a. 3
- b. 7
- c. 9**
- d. 15

$4x - 15 = 2x + 3$
 $2x = 18$

Given: $\overline{AB} \cong \overline{AC}$, M is the midpoint of \overline{BC}
 Prove: $\angle B \cong \angle C$

MGSE9-12.G.CO.7,8,9 DOK 2

9. $\overline{MC} \cong \overline{BM}$ C
 10. $\overline{AM} \cong \overline{AM}$ D
 11. $\triangle ABM \cong \triangle ACM$ A
 12. $\angle B \cong \angle C$ B

A SSS congruence criterion
 B Corresponding parts of congruent triangles are congruent. (CPCTC)
 C Definition of midpoint
 D Reflexive property of congruence

13. A ramp that is being constructed must be 42 inches long and reach a ledge that is 21 inches tall. Which inverse trig ratio could be used to find the $m\angle B$? MGSE9-12.G.SRT.8 DOK 2

a. $\sin^{-1} \frac{21}{42}$
 b. $\sin^{-1} \frac{42}{21}$
 c. $\cos^{-1} \frac{21}{42}$
 d. $\sin^{-1} \frac{21\sqrt{3}}{42}$

14. Which item can be given as a statement in a proof? MGSE9-12.G.CO.9 DOK 1

- a. Given
- b. Definition of complementary angles
- c. $m\angle 1 + m\angle 2 = 180^\circ$
- d. Transitive property of equality

15. Given: $\angle A \cong \angle D$, $\angle B \cong \angle E$, $\angle C \cong \angle F$, $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, and $\overline{CA} \cong \overline{FD}$. Give the congruence statement. MGSE9-12.G.CO.7 DOK 2

- a. $\triangle BCA \cong \triangle DEF$
- b. $\triangle ABC \cong \triangle DEF$
- c. $\triangle BCA \cong \triangle FED$
- d. $\triangle ACB \cong \triangle DEF$

17. What is the volume of a cylinder with diameter = 10' and height = 20'? MGSE9-12.G.GMD.3 DOK 2

- a. 200 ft^3
- b. $500\pi \text{ ft}^3$
- c. $2000\pi \text{ ft}^3$
- d. 500 ft^3

$V = \pi r^2 h$
 $V = \pi 5^2 (20)$

18. Which similarity postulate or theorem lets you conclude that $\triangle JKL \sim \triangle MNO$? MGSE9-12.G.SRT.3

DOK 2

	<p>a. AA</p> <p>b. SSS~</p> <p>c. SAS~</p> <p>d. AAS</p>
--	--

19. What is the length of \overline{AC} ? MGSE9-12.G.SRT.5 DOK 2

$\frac{x}{30} = \frac{20}{50}$

	<p>a. 10</p> <p>b. 12</p> <p>c. 15</p> <p>d. 20</p>
--	---

20. Find the measure of $\angle RST$. MGSE9-12.G.CO.10 DOK 3

$8x + 4 = 5x - 4 + 5x - 4$
 $8x + 4 = 10x - 8$
 $12 = 2x$
 $x = 6$

	<p>a. 6</p> <p>b. 26°</p> <p>c. 52°</p> <p>d. 13°</p>
--	---

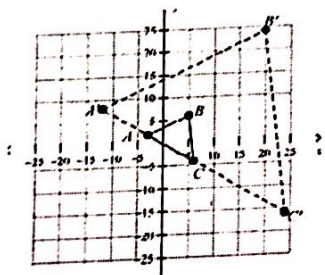
21. In the figure below, find the value of x that would force the lines to be parallel. MGSE9-12.G.CO.9

DOK 2

$21x + 12 = 180$

	<p>a. 8</p> <p>b. 5.33</p> <p>c. -5.33</p> <p>d. 9.33</p>
--	---

22. Identify the transformation from the original to the image, and tell whether the two figures are similar or congruent. The original figure has solid sides; the image has dashed sides. MGSE9-12.G.SRT.2; DOK 2



- a) The transformation is a dilation. The triangles are congruent
- b) The transformation is a translation. The triangles are similar but not congruent
- c) The transformation is a dilation. The triangles are similar but not congruent
- d) The transformation is a rotation. The triangles are similar but not congruent

23. If $\sin 52^\circ \approx 0.788$, what is the approximate value of $\cos 38^\circ$? MGSE9-12.G.SRT.7 DOK 2
- a. 0.212 b. 0.384 c. 0.616 **d. 0.788**

24. Which congruence criterion can be used to show that $\triangle ABC \cong \triangle ADE$? MGSE9-12.G.CO.8 DOK 2

	<p>a. SSS b. ASA c. SAS d. HL</p>
--	---

25. Which coordinate notation correctly describes a transformation that maps black triangle to gray triangle? MGSE9-12.G.CO.6 DOK 2

	<p>a. The rotation $(x, y) \rightarrow (-x, -y)$ b. The translation $(x, y) \rightarrow (x + 6, y - 2)$ c. The rotation $(x, y) \rightarrow (-y, -x)$ d. The translation $(x, y) \rightarrow (x + 4, y - 8)$</p>
--	--

26. Which of the following statements is definitely true, given $\angle A \cong \angle X$ and $\angle C \cong \angle Z$? MGSE9-12.G.CO.10 DOK 3

	<p>a. $\angle B \cong \angle Y$ b. $\triangle ABC \cong \triangle XYZ$ c. $\triangle ABC \cong \triangle ZXY$ d. $AC = ZX$</p>
--	--

27. Use the triangle below to find $\tan \angle V$. MGSE9-12.G.SRT.6 DOK 2

	<p>a. $\frac{2}{5}$ b. $\frac{5}{2}$ c. 68° d. 22°</p>
--	--

28. The radius of an official NBA basketball is about 4.7 inches. What is the volume of an NBA basketball?

MGSE9-12.G.GMD.3 DOK 2

$V = \frac{4}{3} \pi (4.7)^3$

- a. 69.4 in^3
- b. 244.6 in^3
- c. 277.6 in^3
- d. 434.9 in^3

29. Find the volume. MGSE9-12.G.GMD.3 DOK 2

	<ul style="list-style-type: none"> a. 2.0 cm^3 b. 4 cm^3 c. 6 cm^3 d. 12 cm^3 <p>$V = \frac{1}{3} B h$ $V = \frac{1}{3} (4)(3)$</p>
--	---

30. Which 3-dimensional figure could best be used to model a log cut from a tree trunk?

MGSE9-12.G.MG.1 DOK 1

- a. Sphere
- b. Cylinder
- c. Cone
- d. Rectangular prism

31. Find YX MGSE9-12.G.CO.10 DOK 3

	<ul style="list-style-type: none"> a. 7 b. 16 c. 12 d. 3 <p>$2(2x+29) = x+25$ $4x+58 = x+25$ $3x = -33$ $x = -11$</p>
--	---

32. Solve for x. MGSE9-12.G.SRT.8 DOK 2

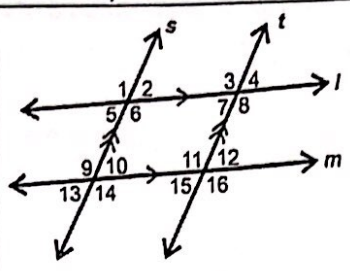
	<ul style="list-style-type: none"> a. $\sqrt{19}$ b. $\sqrt{209}$ c. 1 d. $\sqrt{11}$ <p>$x^2 + \sqrt{15}^2 = 4^2$ $x^2 + 15 = 16$ $x^2 = 1$</p>
--	--

33. What is the circumference of a circle with an area= $36\pi \text{ in}^2$? MGSE9-12.G.GMD.1 DOK 2

- a. $12\pi \text{ in}$
- b. $18\pi \text{ in}$
- c. 12 in
- d. $6\pi \text{ in}$

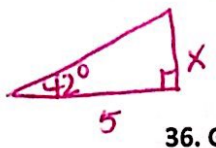
$36\pi = \pi r^2$
 $r = 6$
 $C = 2\pi r$
 $C = 2\pi(6)$

34. If $\angle 1 \cong \angle 8$, which two lines are parallel and by what theorem? *MGSE9-12.G.CO.9 DOK 3*



- a. No lines are //
- b. $s // t$ by the converse of the alternate interior angles theorem.
- c. $s // t$ by the converse of the alternate exterior angles theorem.**
- d. $l // m$ by the converse of the corresponding angles postulate.

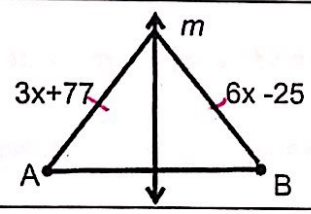
$\tan 42 = \frac{x}{5}$



35. Anne sees a rocket at an angle of elevation of 42 degrees. If the rocket launch pad is 5 miles away from Anne, then how high is the rocket? *MGSE9-12.G.SRT.8 DOK 2*

- a. 3.35 miles
- b. 3.72 miles
- c. 4.5 miles**
- d. 5.55 miles

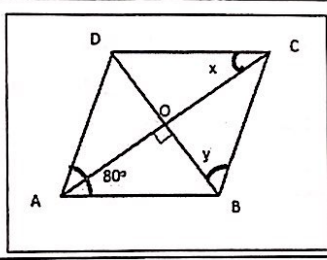
36. Given m is the perpendicular bisector of AB , solve for x . *MGSE9-12.G.CO.9 DOK 2*



- a. 34**
- b. 179
- c. 51
- d. 230

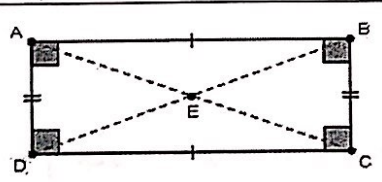
$3x + 77 = 6x - 25$
 $102 = 3x$

37. Given rhombus $ABCD$, solve for y . *MGSE9-12.G.CO.11 DOK 2*



- a. 100°
- b. 50°**
- c. 40°
- d. 20°

38. If $AC=14$, find DE . *MGSE9-12.G.CO.11 DOK 2*



- a. 14
- b. 6
- c. 10
- d. 7**

39. Solve for x. MGSE9-12.G.SRT.5 DOK 2

	<p>a. 4.625 b. 2.5 c. 2 d. 5</p> <p>$\frac{4}{6} = \frac{6}{2x-1}$ $36 = 8x - 4$ $40 = 8x$</p>
--	--

40. The smaller Δ is transformed to create the larger Δ . What is the scale factor of the dilation centered at the origin?

	<p>a. 4 b. 2 c. 1 d. $\frac{1}{2}$</p> <p>MGSE9-12.G.SRT.1 DOK 2</p>
--	--

41. Give the equation of the circle with center $(-2, 0)$ and radius $= 5\sqrt{2}$. DOK2 MGSE9-12.G.GPE.1

- a) $(x + 2)^2 + y^2 = 20$
 b) $(x - 2)^2 + y^2 = 20$
 c) $x^2 + (y + 2)^2 = 50$
 d) $(x + 2)^2 + y^2 = 50$

42. Give the vertex and the concavity (up or down) for $f(x) = -3x^2 + 3x - 5$. DOK2 MGSE9-12.A.SSE.1

- a) $(\frac{1}{2}, -5), \uparrow$
 b) $(0, -5), \downarrow$
 c) $(\frac{1}{2}, -\frac{17}{4}), \uparrow$
 d) $(\frac{1}{2}, -5), \downarrow$
- $x = \frac{-3}{-6} = \frac{1}{2}$

43) What are the x-intercepts for the equation $f(x) = x^2 + 4x - 12$? DOK2 MGSE9-12.F.IF.4

- a) $(0, 0), (-12, 0)$
 b) $(4, 0), (-12, 0)$
 c) $(-2, 0), (6, 0)$
 d) $(-6, 0), (2, 0)$

46) Which of the following is a factor of $x^2 + 3x - 40$? DOK2 MGSE9-12.A.SSE.2

- a) $(x + 5)$
 b) $(x - 8)$
 c) $(x - 5)$
 d) $(x - 2)$
- $(x + 8)(x - 5) = 0$
 $x = -8, 2$

47) What type of quadratic expression is $x^2 - 25$? DOK2 MGSE9-12.A.SSE.2

- a) Perfect Square Trinomial
 b) Sum of Squares
 c) Difference of Squares
 d) None of these

48) Completely factor the expression $45x^2 - 20y^8$ if possible. DOK3 MGSE9-12.A.SSE.2

- a) $5(3x + 2y^4)(3x - 2y^4)$
- b) $(15x + 10y^4)(3x - 2y^4)$
- c) $(3x + 2y^4)(15x - 10y^4)$
- d) Prime (not possible)

49) Write a quadratic with the roots -3 and 5. DOK2 MGSE9-12.A.SSE.3a

- a) $y = x^2 + 2x + 15$
- b) $y = x^2 + 2x - 15$
- c) $y = x^2 - 2x - 15$
- d) $y = x^2 - 2x + 15$

$(x+3)(x-5)$
 $x^2 - 2x - 15$



50) Solve $6x^2 - x - 2 = 0$ DOK2 MGSE9-12.A.SSE.3a

- a) $\left\{\frac{1}{2}, \frac{2}{3}\right\}$
- b) $\left\{\frac{-1}{2}, \frac{-2}{3}\right\}$
- c) $\left\{\frac{1}{2}, \frac{2}{3}\right\}$
- d) No solution

$6x^2 - 4x + 3x - 2 = 0$
 $2x(3x-2) + 1(3x-2)$
 $(2x+1)(3x-2)$



51) Factor completely $10x^3 - 25x^2 - 35x$ DOK2 MGSE9-12.A.SSE.2

- a) $5(2x - 7)(x + 1)$
- b) $x(5x + 7)(2x - 5)$
- c) $5x(2x - 7)(x + 1)$
- d) Will not factor (prime)

$5x(2x^2 - 5x - 7)$
 $5x[2x^2 + 2x - 7x - 7]$
 $5x[2x(x+1) - 7(x+1)]$

52) Give the vertex and concavity (up or down) for $f(x) = -3(x + 2)^2 - 5$ DOK2 MGSE9-12.A.SSE.1

- a) $(-2, -5), \downarrow$
- b) $(2, 5), \downarrow$
- c) $(-2, -5), \uparrow$
- d) $(2, 5), \uparrow$

53) Give the AOS and max/min for $f(x) = -3(x + 2)^2 - 5$ DOK2 MGSE9-12.F.IF.7a

- a) $x = 2, \max = 5$
- b) $x = 2, \min = 5$
- c) $x = -2, \max = -5$
- d) $x = -2, \min = -5$

54) What is the y-intercept in the graph of $f(x) = -2x^2 - 3x + 1$? DOK1 MGSE9-12.F.IF.7a

- a) $(1, 0)$
- b) $(0, 1)$
- c) $(0, 0.5)$
- d) None

55) What is the domain and range of the equation $f(x) = -3(x + 2)^2 - 5$? DOK2 MGSE9-12.F.IF.7a

- a) D: all reals; R: $y \leq -5$
- b) D: $x \leq -5$; R: all reals
- c) D: all reals; R: $y \geq -5$
- d) D: all reals; R: $y \geq 5$

56) In the triangles shown below, ΔABC is dilated by a factor of $\frac{2}{3}$ to form ΔXYZ DOK2 MGSE9-12.G.SRT.2

Given that $m\angle A = 50^\circ$ and $m\angle B = 100^\circ$, what is m .

- A. 15°
- B. 25°
- C. 30°
- D. 50°

57) In the triangle shown, $\overline{GH} \parallel \overline{DF}$

DOK2 MGSE9-12.G.SRT.4

	<p>What is the length of \overline{GE}?</p> <p>A. 2.0 <input checked="" type="radio"/> B. 4.5 C. 7.5 D. 8.0</p> <p>$\frac{x}{3} = \frac{6}{4}$ $4x = 18$ $x = 4.5$</p>
--	---

58) Which has the same value as the expression $(8x^2 + 2x - 6) - (5x^2 - 3x + 2)$? DOK2 MGSE9-12.A.APR.1

- a) $3x^2 - x - 4$
 b) $3x^2 + 5x - 8$
 c) $13x^2 - x - 8$
 d) $13x^2 - 5x - 4$

59) What is the end behavior of the graph of $f(x) = -0.25x^2 - 2x + 1$?

DOK2 MGSE9-12.F.IF.4

- A. As x increases, $f(x)$ increases
 As x decreases, $f(x)$ decreases
 as $x \rightarrow +\infty, y \rightarrow +\infty$
 as $x \rightarrow -\infty, y \rightarrow -\infty$
- B. As x increases, $f(x)$ decreases
 As x decreases, $f(x)$ decreases
 as $x \rightarrow +\infty, y \rightarrow -\infty$
 as $x \rightarrow -\infty, y \rightarrow -\infty$
- C. As x increases, $f(x)$ increases
 As x decreases, $f(x)$ increases
 as $x \rightarrow +\infty, y \rightarrow +\infty$
 as $x \rightarrow -\infty, y \rightarrow +\infty$
- D. As x increases, $f(x)$ decreases
 As x decrease, $f(x)$ increases
 as $x \rightarrow +\infty, y \rightarrow -\infty$
 as $x \rightarrow -\infty, y \rightarrow +\infty$



60) Use this graph to answer the question.

DOK3 MGSE9-12.F.IF.7

	<p>Which function is shown in the graph?</p> <p><input checked="" type="radio"/> A. $f(x) = x^2 - 3x - 10$ B. $f(x) = x^2 + 3x - 10$ C. $f(x) = x^2 + x - 12$ D. $f(x) = x^2 - 5x - 8$</p>
--	---

61) Which expression is equivalent to $\sqrt{32} - \sqrt{8}$?

DOK2 MGSE9-12.N.RN.2

- a) $2\sqrt{2}$
 b) $6\sqrt{2}$
 c) $2\sqrt{6}$
 d) $2\sqrt{10}$

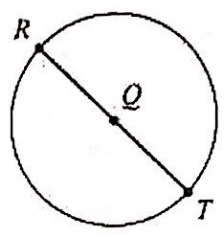
$\sqrt{32} - \sqrt{8}$
 $\sqrt{16 \cdot 2} - \sqrt{4 \cdot 2}$
 $4\sqrt{2} - 2\sqrt{2}$

62) Which expression has a value that is a rational number? DOK3 MGSE9-12.N.RN.3

- a) $\sqrt{10} + 16$ b) $2(\sqrt{5} + \sqrt{7})$ c) $\sqrt{9} + \sqrt{4}$ d) $\sqrt{3} + 0$

63) Consider the beginning of a construction of a square inscribed in circle Q. DOK2 MGSE9-12.G.CO.13

- Step 1: Label point R on circle Q.
 Step 2: Draw a diameter through R and Q.
 Step 3: Label the intersection on the circle point T.



What is the next step in this construction?

- A. Draw radius \overline{SQ} .
 B. Label point S on circle Q.
 C. Construct a line segment parallel to \overline{RT} .
 D. Construct the perpendicular bisector of \overline{RT} .

64) If $\triangle ABC \cong \triangle PQR$ and $\triangle PQR \cong \triangle XYZ$, which of the following angles is congruent to $\angle CAB$? DOK1 MGSE9-12.G.CO.7

- a) $\angle QRP$ b) $\angle XZY$ c) $\angle ZXY$ d) $\angle XYZ$

65) For $\triangle ABC$ and $\triangle DEF$, $\angle A \cong \angle F$ and $\overline{AC} \cong \overline{EF}$. Which of the following would allow you to conclude that $\triangle ABC \cong \triangle DEF$ by AAS? DOK3 MGSE9-12.G.CO.7

- a) $\angle ABC \cong \angle FDE$ b) $\angle ACB \cong \angle EDF$ c) $\angle BAC \cong \angle FDE$ d) $\angle CBA \cong \angle FED$

