RLP-GEOB · RLP Geometry B — Solids, Coordinates, Circles and Probability

Unit 2: Coordinate Geometry

Practice Workbook. The same problems, in the same order, as the Practice sections of the online lessons.

Name _____ Period _____

Lesson 2.1 — Equations of Circles from the Pythagorean Theorem

FLUENCY

1. Find the center and radius of the circle $x^2 - 8x + y^2 + 4y - 61 = 0$.

2. Find the center and radius of the circle $x^2 + 4x + y^2 - 8y + 16 = 0$.

3. Find the center and radius of the circle $x^2 - 8x + y^2 + 2y - 19 = 0$.

4. Find the center and radius of the circle $x^2 + 2x + y^2 - 12y - 27 = 0$.

5. Find the center and radius of the circle $x^2 - 12x + y^2 + 8y + 36 = 0$.

6. Find the center and radius of the circle $x^2 + 6x + y^2 + 8y - 24 = 0$.

7. Write the equation of the circle with center $(-2, 5)$ and radius 3.

8. Write the equation of the circle with center $(1, -3)$ that passes through $(4, 1)$.

9. Is $(5, 2)$ inside, on or outside the circle $(x - 2)^2 + (y + 2)^2 = 25$?

APPLICATION

10. *(Illustrative.)* A cell tower at $(3, -2)$ on a grid in kilometers covers everything within 8 km. Write the coverage boundary and decide whether a ranger station at $(9, 5)$ is covered.

11. A circular garden has the diameter from $(-1, 2)$ to $(5, 10)$. Find its center, radius and equation.

12. Explain why $x^2 + y^2 + 4x - 6y + 20 = 0$ is not a circle.

CHALLENGE

13. Find the equation of the circle through (0, 0), (8, 0) and (0, 6).

REVIEW

14. Find the volume of a rectangular prism 14 cm by 8 cm by 14 cm. Give an exact answer and, if it involves π, a decimal to the nearest tenth.

15. A 1:25 model has volume 80 cm^3. Find the real volume in m^3.

16. A right triangle has legs 9 and 40. Find the hypotenuse.

Lesson 2.2 — Slope Criteria and Partitioning Segments

FLUENCY

1. Write the equation of the line perpendicular to $y = -(2/3)x + 1$ through $(-1, 1)$.

2. Write the equation of the line perpendicular to $y = (4/3)x - 1$ through $(-6, -5)$.

3. Write the equation of the line perpendicular to $y = -4x + 7$ through $(-5, -1)$.

4. Write the equation of the line perpendicular to $y = -5x - 4$ through $(-3, -5)$.

5. Write the equation of the line parallel to $y = -2x - 7$ through $(-6, 4)$.

6. Find the slope of the line through $(-3, 7)$ and $(-2, 5)$.

7. Find the slope of the line through $(2, 1)$ and $(-1, 7)$.

8. Find the point that partitions the directed segment from $(-2, 1)$ to $(10, 7)$ in the ratio $1 : 3$.

9. Find the point that partitions the directed segment from $(-2, 1)$ to $(10, 7)$ in the ratio $2 : 1$.

10. Find the point that partitions the directed segment from $(3, -4)$ to $(-6, 8)$ in the ratio $1 : 2$.

11. Find the point that partitions the directed segment from $(0, 5)$ to $(15, -5)$ in the ratio $3 : 2$.

APPLICATION

12. *(Illustrative.)* A trail runs straight from a trailhead at $(0, 0)$ to a lookout at $(12, 9)$, in hundreds of meters. Water stations go at the points that split the trail into three equal parts. Find them and the spacing in meters.

13. Show that the triangle with vertices (1, 1), (4, 5) and (−3, 4) has a right angle, and name the vertex.

14. A new road must pass through (6, −1) perpendicular to the road $y = 2x - 3$. Write its equation and find where the two roads cross.

CHALLENGE

15. Prove: if two non-vertical lines have slopes m and $-1/m$, they are perpendicular.

REVIEW

16. Find the volume of a square pyramid with base edge 15 cm and height 11 cm. Give an exact answer and, if it involves π, a decimal to the nearest tenth.

17. Name the solid formed by rotating a rectangle about one side.

18. $\sin 20° = \cos ?$

Lesson 2.3 — Proving Theorems with Coordinates

FLUENCY

1. Find the distance between (−4, 1) and (9, 3), and the midpoint of the segment.

2. Find the distance between (−1, −6) and (2, −3), and the midpoint of the segment.

3. Find the distance between (−9, −6) and (−3, 2), and the midpoint of the segment.

4. Find the distance between (1, −9) and (−1, −5), and the midpoint of the segment.

5. Find the distance between (−7, −6) and (1, 6), and the midpoint of the segment.

6. Classify the quadrilateral with vertices (0, 0), (5, 0), (7, 4), (2, 4).

7. Classify the quadrilateral with vertices (1, 1), (5, 1), (5, 4), (1, 4).

8. Find the perimeter and area of the rectangle with vertices (−2, −1), (4, −1), (4, 3), (−2, 3).

APPLICATION

9. *(Illustrative site plan.)* A triangular plaza has corners at (1, 1), (7, 3) and (3, 8), in units of 10 m. Find its area in m^2 and its perimeter in m.

10. Prove that the quadrilateral with vertices (−1, 0), (2, 4), (6, 1) and (3, −3) is a square.

11. **Identify the flaw.** “I checked the rectangle (0, 0), (4, 0), (4, 3), (0, 3): its diagonals are both 5. So all rectangles have congruent diagonals.”

CHALLENGE

12. Prove with coordinates that the segment joining the midpoints of two sides of a triangle is parallel to the third side and half as long.

REVIEW

13. Find the volume of a rectangular prism 9 cm by 2 cm by 5 cm. Give an exact answer and, if it involves π, a decimal to the nearest tenth.

14. A cone and a cylinder share radius 6 and height 10. Find both volumes in terms of π.

Lesson 2.4 — Parabolas from Focus and Directrix

FLUENCY

1. Write the equation of the parabola with focus $(0, 3)$ and directrix $y = -3$.

2. Write the equation of the parabola with focus $(0, -1)$ and directrix $y = 1$.

3. Find the focus and directrix of $x^2 = 20y$.

4. Find the vertex, focus and directrix of $(x - 1)^2 = 8(y + 2)$.

5. Write the equation of the parabola with focus $(3, 5)$ and directrix $y = 1$.

6. Check that $(7, 5)$ lies on $(x - 3)^2 = 8(y - 3)$, and that it is equidistant from the focus $(3, 5)$ and the directrix $y = 1$.

7. Which parabola is wider: $x^2 = 4y$ or $x^2 = 16y$? Where is each focus?

APPLICATION

8. A satellite dish is 80 cm across and 12 cm deep. How far above the vertex should the receiver be placed?

9. A flashlight reflector has its bulb 1.5 cm from the vertex, at the focus. The reflector is 8 cm across. How deep is it?

10. *(Illustrative.)* A solar cooker is 50 cm across and 12 cm deep. Where should the pot sit?

CHALLENGE

11. Derive the equation of the parabola with focus $(h, k + p)$ and directrix $y = k - p$.

REVIEW

12. Find the volume of a rectangular prism 10 cm by 10 cm by 14 cm. Give an exact answer and, if it involves π, a decimal to the nearest tenth.

13. Find the center and radius of $x^2 + y^2 - 10x + 2y + 1 = 0$.

Unit 2 checkpoint

1. The circle $(x + 4)^2 + (y - 1)^2 = 49$ has center and radius:
   A. (4, −1), 7
   B. (−4, 1), 7
   C. (−4, 1), 49
   D. (4, 1), 7
2. $x^2 + y^2 - 8x + 6y = 0$ has radius _____.
3. Which slope is perpendicular to 3/4?
   A. 3/4
   B. −3/4
   C. 4/3
   D. −4/3
4. True or false: Distinct lines with equal slopes are parallel.
5. The point 1/4 of the way from (0, 0) to (8, 12) is:
   A. (2, 3)
   B. (4, 6)
   C. (6, 9)
   D. (2, 4)
6. The point partitioning the directed segment from (1, 1) to (7, 10) in the ratio 1:2 is (3, _____).
7. The distance between (−1, 2) and (5, 10) is:
   A. 8
   B. 10
   C. 14
   D. √28
8. The triangle with vertices (0, 0), (8, 0) and (3, 5) has area _____.

9. True or false: Checking one numerical parallelogram proves that the diagonals of every parallelogram bisect each other.

10. The parabola with focus (0, 4) and directrix $y = -4$ is:
    A. $x^2 = 4y$
    B. $x^2 = 8y$
    C. $x^2 = 16y$
    D. $y^2 = 16x$

11. The parabola $x^2 = 24y$ has its focus at (0, _____).

12. True or false: Quadrilateral (0,0), (4,1), (5,5), (1,4) is a square.