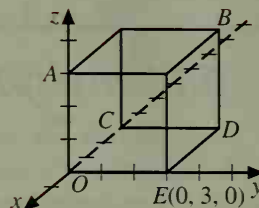## Written Exercises

Use the diagram of the cube shown at the right.

1. Write the coordinates of vertices A, B, C, and D.
2. Which axis contains point A? point E?
3. Which coordinate plane contains C, D, and E?
4. Name two labeled points in the xz-plane.
5. Find the coordinates of the midpoint of diagonal $\overline{AD}$.
6. Find the length of diagonal $\overline{AD}$ of the cube. Give your answer to the nearest tenth.

On which coordinate plane or planes does each point lie?

7. $(3, 4, 0)$　　8. $(-7, 0, -9)$　　9. $(0, -6, 1)$　　10. $(0, 0, -4)$

Graph each point on a coordinate system.

11. $W(0, 2, 5)$　　12. $X(3, -4, -1)$　　13. $Y(-2, -3, 0)$　　14. $Z(4, 1, 3)$

Find the coordinates of the midpoint of the segment that joins the points.

15. $(-7, 0, 0)$ and $(7, 5, -6)$
16. $(0, 2, -5)$ and $(-3, 6, -9)$
17. $(1.8, -3.5, 0)$ and $(7.5, 6, -9.4)$
18. (a, b, c) and (d, e, f)
19. $M(4, -4, -4)$ is the midpoint of $\overline{AB}$, where A is point $(4, -2, 5)$. Find the coordinates of point B.

Find the distance, to the nearest tenth, between the two points.

20. $(-1, 0, -5)$ and $(3, 3, 7)$
21. $(0, -2, 4)$ and $(-9, 6, -8)$
22. $(-6, -2, -7)$ and $(-7, 2, -10)$
23. $(1, 3, 2)$ and $(-8, 3, -2)$

In Exercises 24–26, the coordinates of the vertices of a triangle are given. Is the triangle *scalene*, *isosceles*, or *equilateral*?

24. Triangle RST has vertices $R(-2, 4, -3)$, $S(0, 1, 3)$, and $T(-2, -3, -3)$.
25. Triangle ABC has vertices $A(5, 0, 0)$, $B(0, -5, 0)$, and $C(0, 0, 5)$.
26. Triangle DEF has vertices $D(-1, -3, -1)$, $E(2, 3, 6)$ and $F(3, -1, 6)$.

27. Triangle GHJ has vertices $G(4, 0, 0)$, $H(0, 6, 0)$, and $J(0, 6, 3)$. Use the converse of the Pythagorean theorem to show that the triangle is a right triangle. Then find its area.

28. The equation of a sphere with center (a, b, c) and radius r is
$$(x - a)^2 + (y - b)^2 + (z - c)^2 = r^2.$$
Use the distance formula and the definition of a sphere to justify the equation.