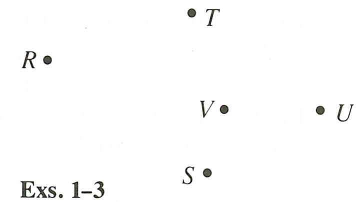
Self-Test 1

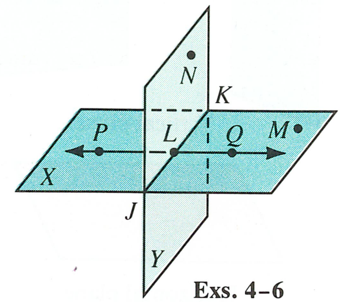
Name the point that appears to satisfy the description.



Exs. 1–3

1. Equidistant from R and S
2. Equidistant from S and U
3. Equidistant from U and T

Classify each statement as true or false.



Exs. 4–6

4. Plane Y and $\overleftrightarrow{PQ}$ intersect in point L.
5. Points J, K, L, and N are coplanar.
6. Points J, L, and Q are collinear.

7. Draw a vertical plane Z intersecting a horizontal line l in a point T.

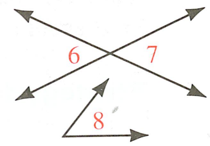
Algebra Review: *Linear Equations*

Find the value of the variable.

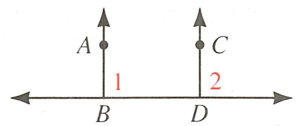
1. $c + 5 = 12$
2. $8 + c = 13$
3. $c - 5 = 12$
4. $7 - z = 13$
5. $15 - z = 0$
6. $4x = 28$
7. $3x = 15$
8. $7x = -35$
9. $-5x = -5$
10. $\frac{1}{3}a = 2$
11. $\frac{3}{4}a = 9$
12. $\frac{4}{5}a = -20$
13. $-2b = 6$
14. $-3b = -9$
15. $-9b = 2$
16. $42 = 6k$
17. $5 = 10k$
18. $-16 = -4k$
19. $12 = \frac{e}{2}$
20. $-9 = \frac{e}{3}$
21. $5 = -\frac{e}{3}$
22. $2p + 5 = 13$
23. $3p - 5 = 13$
24. $4p + 2 = 22$
25. $60 = 6t + 12$
26. $12 = 3r - 9$
27. $55 = 7s - 8$
28. $8x + 2x = 90$
29. $8x - 2x = 90$
30. $x + 9x = 5$
31. $(2g - 15) + g = 9$
32. $3u + (u - 2) = 10$
33. $(w - 20) + 5w = 28$
34. $3x = 2x - 17$
35. $5y = 3y + 26$
36. $7z = 180 - 2z$
37. $12 + 3b = 2 + 5b$
38. $4c + 23 = 9c - 7$
39. $7h + (90 - h) = 210$
40. $5x + (180 - x) = 300$
41. $(4f + 5) + (5f + 40) = 180$
42. $(3g - 4) + (4g + 10) = 90$
43. $2(4d + 4) = d + 1$
44. $2(d + 5) = 3(d - 2)$
45. $180 - x = 3(90 - x)$
46. $3(180 - y) = 2(90 - y)$

10. State the theorem that justifies the statement $\angle 6 \cong \angle 7$.

11. Suppose you have already stated that $\angle 6 \cong \angle 7$ and $\angle 7 \cong \angle 8$. What property of congruence justifies the conclusion that $\angle 6 \cong \angle 8$?



12. Write a proof in two-column form.
Given: $\overrightarrow{DC} \perp \overleftrightarrow{BD}$; $\angle 1 \cong \angle 2$
Prove: $\overrightarrow{BA} \perp \overleftrightarrow{BD}$



Algebra Review: *Systems of Equations*

Solve each system of equations by the substitution method.

Example 1 (1) $y = 5 - 2x$
(2) $5x - 6y = 21$

Solution Substitute $5 - 2x$ for y in (2): $5x - 6(5 - 2x) = 21$
$17x - 30 = 21$; $x = 3$

Substitute 3 for x in (1): $y = 5 - 2(3) = -1$

The solution is $x = 3$, $y = -1$.

1. $y = 3x$
$5x + y = 24$

2. $y = 2x + 5$
$3x - y = 4$

3. $x = 8 + 3y$
$2x - 5y = 8$

4. $3x + 2y = 71$
$y = 4 + 2x$

5. $4x - 5y = 92$
$x = 7y$

6. $y = 3x + 8$
$x = y$

7. $8x + 3y = 26$
$2x = y - 4$

8. $x - 7y = 13$
$3x - 5y = 23$

9. $3x + y = 19$
$2x - 5y = -10$

Solve each system by the method of addition or subtraction.

Example 2 (1) $3x - y = 13$
(2) $4x + y = 22$

Solution Add (1) and (2):
$7x = 35$; $x = 5$
Substitute 5 for x in (2):
$4(5) + y = 22$; $y = 2$
The solution is $x = 5$, $y = 2$.

Example 3 (1) $6x + 15y = 90$
(2) $6x - 14y = 32$

Solution Subtract (2) from (1):
$29y = 58$; $y = 2$
Substitute 2 for y in (1):
$6x + 15(2) = 90$; $x = 10$
The solution is $x = 10$, $y = 2$.

10. $5x - y = 20$
$3x + y = 12$

11. $x + 3y = 7$
$x + 2y = 4$

12. $3x - 2y = 11$
$3x - y = 7$

13. $7x + y = 29$
$5x + y = 21$

14. $8x - y = 17$
$6x + y = 11$

15. $9x - 2y = 50$
$6x - 2y = 32$

16. $7y = 2x + 35$
$3y = 2x + 15$

17. $2y = 3x - 1$
$2y = x + 21$

18. $19 = 5x + 2y$
$1 = 3x - 4y$

Algebra Review: *Radical Expressions*

The symbol $\sqrt{}$ always indicates the positive square root of a number. The *radical* $\sqrt{64}$ can be *simplified*.

Simplify.

Example 1 **a.** $\sqrt{56}$ **b.** $\sqrt{\frac{16}{3}}$ **c.** $(3\sqrt{7})^2$

Solution **a.** $\sqrt{56} = \sqrt{4 \cdot 14} = \sqrt{4} \cdot \sqrt{14} = 2\sqrt{14}$

b. $\sqrt{\frac{16}{3}} = \frac{\sqrt{16}}{\sqrt{3}} = \frac{4}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{3}}{3}$

c. $(3\sqrt{7})^2 = 3\sqrt{7} \cdot 3\sqrt{7} = 3 \cdot 3 \cdot \sqrt{7} \cdot \sqrt{7} = 9 \cdot 7 = 63$

1. $\sqrt{36}$ **2.** $\sqrt{81}$ **3.** $\sqrt{24}$ **4.** $\sqrt{98}$ **5.** $\sqrt{300}$

6. $\sqrt{\frac{1}{4}}$ **7.** $\frac{\sqrt{5}}{\sqrt{3}}$ **8.** $\sqrt{\frac{80}{25}}$ **9.** $\frac{2\sqrt{3}}{\sqrt{12}}$ **10.** $\sqrt{\frac{250}{48}}$

11. $\sqrt{13^2}$ **12.** $(\sqrt{17})^2$ **13.** $(2\sqrt{3})^2$ **14.** $(3\sqrt{8})^2$ **15.** $(9\sqrt{2})^2$

16. $5\sqrt{18}$ **17.** $4\sqrt{27}$ **18.** $6\sqrt{24}$ **19.** $5\sqrt{8}$ **20.** $9\sqrt{40}$

Solve for x. Assume x represents a positive number.

Example 2 $2^2 + x^2 = 4^2$

Solution

$$\begin{aligned} 4 + x^2 &= 16 \\ x^2 &= 12 \\ x &= \sqrt{12} \\ x &= 2\sqrt{3} \end{aligned}$$

Example 3 $x^2 + (3\sqrt{2})^2 = 9^2$

Solution

$$\begin{aligned} x^2 + 18 &= 81 \\ x^2 &= 63 \\ x &= \sqrt{63} \\ x &= 3\sqrt{7} \end{aligned}$$

21. $3^2 + 4^2 = x^2$ **22.** $x^2 + 4^2 = 5^2$ **23.** $5^2 + x^2 = 13^2$

24. $x^2 + 3^2 = 4^2$ **25.** $4^2 + 7^2 = x^2$ **26.** $x^2 + 5^2 = 10^2$

27. $1^2 + x^2 = 3^2$ **28.** $x^2 + 5^2 = (5\sqrt{2})^2$ **29.** $(x)^2 + (7\sqrt{3})^2 = (2x)^2$

Challenge

Given regular hexagon $ABCDEF$, with center O and sides of length 12. Let G be the midpoint of $\overline{BC}$. Let H be the midpoint of $\overline{DE}$. $\overline{AH}$ intersects $\overline{EB}$ at J and $\overline{FG}$ intersects $\overline{EB}$ at K.

Find JK.

(*Hint*: Draw auxiliary lines $\overline{HG}$ and $\overline{DA}$.)