

# MANIPULATING EQUATIONS

i.  $x + 6 = 9$   
 $x =$

ii.  $33 = 11(4x - 4)$   
 $x =$

iii.  $\frac{1}{2}x + \frac{1}{4}x + \frac{1}{8}x = 49$   
 $x =$

1. If  $\frac{24}{x} = \frac{3}{4}$ , then  $x =$

- (A) 16
- (B) 18
- (C) 30
- (D) 32
- (E) 36

2. If  $(a + 3) + b = 0$ , then  $a + b =$

- (A) -3
- (B)  $-\frac{3}{2}$
- (C) 0
- (D)  $\frac{3}{2}$
- (E) 3

4. If the sum of  $q - 6$ ,  $q - 3$ , and  $q$  is 0, what is the value of  $q$ ?

- (A) 5
- (B) 4
- (C) 3
- (D) 2
- (E) 0

4. If  $4x + 6 = 30$  then  $2x$  equals

- (A) 2
- (B) 4
- (C) 6
- (D) 8
- (E) 12

4. If  $\frac{400}{100(x+3)} = 4$ , then what does  $x$  equal?

- (A) -4
- (B) -3
- (C) -2
- (D) -1
- (E) 0

18. If  $5z = 10 + 2z$ , what is the value of  $9z$ ?

●	7	7	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

5. If  $\frac{x+4}{7} = \frac{4}{9}$ , then  $x$  equals

- (A)  $-\frac{8}{9}$
- (B)  $-\frac{1}{4}$
- (C)  $\frac{1}{4}$
- (D)  $\frac{24}{9}$
- (E)  $\frac{36}{7}$

14. If  $\frac{4}{x} = \frac{6}{7}$  and  $\frac{3x}{a} = \frac{7}{2}$ , then  $a$  equals

- (A)  $2\frac{1}{3}$
- (B) 3
- (C)  $3\frac{1}{2}$
- (D) 4
- (E)  $4\frac{2}{3}$

17. If  $\frac{8y}{3} - 4 = \frac{1}{6}$ , then  $\frac{1}{y}$  equals

- (A) 16
- (B)  $\frac{25}{16}$
- (C) 1
- (D)  $\frac{2}{3}$
- (E)  $\frac{16}{25}$

## INEQUALITIES

5. If  $10 - x < 14$ , which of the following expresses the entire range of possible values for  $x$ ?
- (A)  $x < 4$   
 (B)  $x < 2$   
 (C)  $x > -4$   
 (D)  $x > 4$   
 (E)  $x = 4$
5. If  $12 + 3x > x$ , which of the following expresses the entire range of possible values for  $x$ ?
- (A)  $x > -3$   
 (B)  $x < 3$   
 (C)  $x < 6$   
 (D)  $x > 6$   
 (E)  $x > -6$
6.  $4x - 14 > -6$  is equivalent to
- (A)  $2x < -5$   
 (B)  $2x < -2$   
 (C)  $x > -5$   
 (D)  $x > -2$   
 (E)  $x > 2$
6. If  $7x - 5 < 13 + 4x$ , what is the value of  $x$ ?
- (A)  $x > 18$   
 (B)  $x > 6$   
 (C)  $x < 6$   
 (D)  $x < \frac{17}{2}$   
 (E)  $x < 18$
7. Which of the following gives the correct order from least to greatest?
- (A)  $\frac{8}{9} < \frac{5}{7} < \frac{3}{5}$   
 (B)  $\frac{8}{9} < \frac{3}{5} < \frac{5}{7}$   
 (C)  $\frac{5}{7} < \frac{3}{5} < \frac{8}{9}$   
 (D)  $\frac{3}{5} < \frac{8}{9} < \frac{5}{7}$   
 (E)  $\frac{3}{5} < \frac{5}{7} < \frac{8}{9}$
9. If  $3x - 8 < 12 + 5x$ , then
- (A)  $x > 10$   
 (B)  $x < 10$   
 (C)  $x > -10$   
 (D)  $x < -10$   
 (E)  $x > 0$
12. If  $-5 < m < 10$  and  $2 < n < 4$ , which of the following must be true for  $(m + n)$ ?
- (A)  $-3 < (m + n) < 14$   
 (B)  $-7 < (m + n) < 6$   
 (C)  $-5 < (m + n) < 12$   
 (D)  $8 < (m + n) < 14$   
 (E)  $12 < (m + n) < 14$
13. If  $\frac{7-2y}{3} < -5$ , then
- (A)  $y < -4$   
 (B)  $y < 11$   
 (C)  $y > -4$   
 (D)  $y > 4$   
 (E)  $y > 11$

14. If  $a > 5$  and  $b > 4$ , then which of the following must be true?
- I.  $a > b$
  - II.  $a + b > 9$
  - III.  $a + b > 11$
- (A) I only  
(B) II only  
(C) I and II only  
(D) II and III only  
(E) I, II, and III
15. If  $q, r, s, t, u$  are consecutive positive integers such that  $q > r > s > t > u$ , what is  $(q - r)(r - s) - (s - t)(t - u)$ ?
- (A)  $-2$   
(B)  $-1$   
(C)  $0$   
(D)  $1$   
(E) It cannot be determined from the information given.
16. If  $13 \leq 31 - 2x \leq 39$ , which of the following represents all possible values of  $x$ ?
- (A)  $-9 \leq x \leq 4$   
(B)  $-4 \leq x \leq 4$   
(C)  $-4 \leq x \leq 9$   
(D)  $9 \leq x \leq 22$   
(E)  $22 \leq x \leq 35$
22. Which of the following accurately defines the range of  $p - q$  if  $15 \leq p \leq 30$  and  $7 \leq q \leq 19$ ?
- (A)  $-4 \leq (p - q) \leq 23$   
(B)  $-4 \leq (p - q) \leq 30$   
(C)  $8 \leq (p - q) \leq 11$   
(D)  $15 \leq (p - q) \leq 23$   
(E)  $22 \leq (p - q) \leq 49$

## EXPONENTS

When in doubt, expand it out.

2. If  $q^2 = 81$ , then  $(q + 1)(q - 1) =$

- (A) 79
- (B) 80
- (C) 81
- (D) 82
- (E) 83

3.  $10,000 + (3 \times 10^2) =$

- (A) 4,000
- (B) 10,003
- (C) 10,030
- (D) 10,300
- (E) 13,000

3.  $(3x^3y^4)^4 =$

- (A)  $12x^7y^8$
- (B)  $27x^9y^8$
- (C)  $81x^7y^8$
- (D)  $81x^{12}y^{16}$
- (E)  $81x^{81}y^{256}$

3.  $(3^2)^2 =$

- (A) 18
- (B) 27
- (C) 81
- (D) 729
- (E) 6,561

3.  $5^9 \div 5^3 =$

- (A)  $5^{12}$
- (B)  $5^6$
- (C)  $5^5$
- (D)  $5^3$
- (E) 5

7. If  $3^9 \cdot 9^3 = 27^2 \cdot 3^k$  then  $k =$

- (A) 4
- (B) 6
- (C) 8
- (D) 9
- (E) 12

7. If  $a = 5$  and  $b = 2$ , then  $a^2b - ab^2 + (ab)^2 =$

- (A) 20
- (B) 50
- (C) 100
- (D) 130
- (E) 170

8. If  $w$  is a positive integer, then  $(2w)^3 =$

- (A)  $2w^3$
- (B)  $4w^2$
- (C)  $8w$
- (D)  $8w^3$
- (E)  $16w$

Column A

Column B

$3a = 12$

4.

$3a^2$

$12^2$

6.

$3^{12}$

$9^6$

7.  $\left(-\frac{9}{11}\right)^{17}$

$\left(-\frac{9}{11}\right)^{16}$

10.  $\frac{(x^7)^2}{x^8}$

$\frac{x^9}{x^3}$

12.  $\left(-\frac{3}{4}\right)^k$  will be greatest for which of the

following values of  $k$ ?

- (A) 5
- (B) 4
- (C) 3
- (D) 2
- (E) 1

24.  $\frac{1}{10^{11}} - \frac{1}{10^{12}} =$

- (A)  $\frac{1}{10}$
- (B)  $\frac{9}{10^{12}}$
- (C)  $\frac{1}{10^{12}}$
- (D)  $-\frac{9}{10^{12}}$
- (E)  $-\frac{1}{10}$

## ROOTS

3. Column A

$$\sqrt{3} + \sqrt{4}$$

Column B

$$\sqrt{7}$$

6. If  $a = 25$  and  $b = 16$ , then for what value of  $c$  will  $\sqrt{a} + \sqrt{b} + \sqrt{c} = 15$ ?

- (A) 9  
(B) 16  
(C) 25  
(D) 36  
(E) 49

8.  $(\sqrt{24})(\sqrt{3}) =$

- (A)  $3\sqrt{6}$   
(B)  $2\sqrt{24}$   
(C) 6  
(D)  $4\sqrt{3}$   
(E)  $6\sqrt{2}$

10.  $\sqrt{\frac{1}{4}} + \sqrt{\frac{1}{16}} + \sqrt{\frac{9}{4}} =$

- (A)  $\frac{1}{4}$   
(B)  $\frac{11}{16}$   
(C)  $\frac{9}{4}$   
(D)  $\frac{41}{16}$   
(E)  $\frac{83}{16}$

10. If  $a = 2$  and  $b = 3$ , then what does

$$a^2 + b^2 - \sqrt{a^2 b^2}$$
 equal?

- (A) 5  
(B) 6  
(C) 7  
(D) 13  
(E) 19



**STOP! YOUR HOMEWORK IS DONE!  
GO GET SOME EXERCISE.**