Chapter 0 Algebraic Concepts 2

Section 7

1. Simplify the fraction.
$\frac{12a^6b^8}{24a^3b}$
A) $\frac{1}{2a^3b}$
B) $\frac{a^3b^8}{12}$
C) $\frac{a^3b^7}{2}$
D) $\frac{b^8}{12a^3}$
E) $\frac{a^3}{2b}$
Ans: C

2. Simplify the fraction.
$\frac{x^2-5x+6}{x^2-4}$
A) $\frac{x-2}{x+3}$
B) $\frac{x-3}{x-2}$
C) $\frac{x+2}{x-3}$
D) $\frac{x-3}{x+2}$
E) $\frac{x+3}{x-2}$
Ans: D

3. Simplify the fraction.

$$\frac{x^2-10x+25}{x^2-7x+10}$$

A) $\frac{x+5}{x-2}$

B) $\frac{x+1}{x-10}$

C) $\frac{x-5}{x-2}$

D) $\frac{x-10}{x-1}$

E) $\frac{x-2}{x+5}$

Ans: C

4. Simplify the fraction.

$$\frac{x^2-8x+16}{16-x^2}$$

A) $\frac{-x+4}{x+4}$

B) $\frac{x+4}{x-4}$

C) $\frac{-x-4}{x-4}$

D) $\frac{x-4}{x+4}$

E) $\frac{x-4}{x+4}$

Ans: A

5. Perform the indicated operations and simplify.

$$\frac{15x^2}{9y^2}\cdot\frac{6x}{25y^2}\cdot\frac{15y^3}{x^2}$$

A) $\dfrac{3x^2}{y}$

B) $\dfrac{6x}{y}$

C) $\dfrac{6}{y}$

D) $\dfrac{3x}{y}$

E) $\dfrac{6x}{y^2}$

Ans: B

6. Perform the indicated operations and simplify.

$$\frac{9ac^2}{15a^2c}\cdot\frac{2ad^3}{15abc^3}$$

A) $\dfrac{2ad^3}{25bc^3}$

B) $\dfrac{6ad^3}{5bc^2}$

C) $\dfrac{2d^3}{5ac}$

D) $\dfrac{2d^3}{25abc^2}$

E) $\dfrac{9d^3}{5abc^2}$

Ans: D

7. Perform the indicated operations and simplify.

$$\frac{6x-6}{x-3}\cdot\frac{5x-15}{9x-9}$$

A) $\dfrac{2}{x-3}$

B) $\dfrac{10}{3}$

C) $\dfrac{2}{5x-15}$

D) $\dfrac{6}{5}$

E) $\dfrac{x-3}{5}$

Ans: B

8. Perform the indicated operations and simplify.

$$(x^2-16)\cdot\frac{3x-2}{x+4}$$

A) $(x-3)(4x-2)$

B) $(x-4)(3x-2)$

C) $(x-4)\dfrac{(3x-2)}{x+4}$

D) $(x+4)(3x-2)$

E) $(x-3)\dfrac{(3x+2)}{x+4}$

Ans: B

9. Perform the indicated operations and simplify.

$$\frac{5x+5}{x-2}\cdot\frac{x^2-5x+6}{10x^2+10x}$$

A) $\dfrac{5x+3}{x-3}$

B) $\dfrac{5x+3x^2}{x-2}$

C) $\dfrac{x-3}{2x}$

D) $\dfrac{x^2+5x-3}{2x}$

E) $\dfrac{5+3x^2}{x-5}$

Ans: C

10. Express the following expression as a single fraction with no common factors in the numerator and denominator.

$$\frac{x^2-5x-6}{x^2+2x-3}\cdot\frac{x^2+7x+12}{x^3-6x^2}\cdot\frac{x^3-x}{x^2-2x+1}$$

A) $\dfrac{(x+3)(x+4)}{x(x-1)^2}$

B) $\dfrac{(x-1)^2(x+4)}{x}$

C) $\dfrac{(x+1)^2(x+4)}{x(x-1)^2}$

D) $\dfrac{(x+3)(x+4)}{x(x+1)}$

E) $\dfrac{(x+3)(x+4)}{x}$

Ans: C

11. Perform the indicated operations and simplify.

$$\frac{20}{x-3}\div\frac{5}{4x-12}$$

A) 20

B) $x-3$

C) $\dfrac{x-12}{5}$

D) 16

E) $\dfrac{x-3}{4}$

Ans: D

12. Perform the indicated operations and simplify.

$$\frac{y^2-2y+1}{7y^2-7y} \div \frac{y^2-4y+3}{35y^2}$$

A) $\dfrac{y-3}{35(y-1)}$

B) $\dfrac{5y(y-1)}{y-4}$

C) $\dfrac{y-4}{5(y-1)^2}$

D) $\dfrac{y-1}{y-5}$

E) $\dfrac{5y}{y-3}$

Ans: E

13. Perform the indicated operations and simplify.

$$\frac{4x^2}{3x^2y-6xy} \div \frac{2x^2+6x}{x^2+x-6}$$

A) $\dfrac{(x+3)}{3y}$

B) $\dfrac{2}{3y(x+3)}$

C) $\dfrac{2(x+3)}{3y(x-2)}$

D) $\dfrac{(x-2)}{3y}$

E) $\dfrac{2}{3y}$

Ans: E

14. Perform the indicated operations and simplify.

$$\frac{4x^2+9x+2}{16x^2-1} \div (x+2)$$

A) $\dfrac{1}{4x-1}$

B) $\dfrac{4x+1}{x+2}$

C) $\dfrac{x+2}{4x-1}$

D) $\dfrac{1}{x-2}$

E) $\dfrac{4x-1}{x+2}$

Ans: A

15. Perform the indicated operations and simplify.

$$\frac{5}{16-x^2} - \frac{x+1}{16-x^2}$$

A) $\dfrac{1}{4+x}$

B) $\dfrac{4+x}{4-x}$

C) $4-x$

D) $\dfrac{4-x}{4+x}$

E) $\dfrac{1}{4-x}$

Ans: A

16. Perform the indicated operations and simplify.

$$x - \frac{6}{x-5}$$

A) $\dfrac{x-6}{x-5}$

B) $\dfrac{(x-1)(x-6)}{x+1}$

C) $\dfrac{(x+1)(x-6)}{x-5}$

D) $\dfrac{x-6}{x+1}$

E) $\dfrac{(x-6)}{x-5}$

Ans: C

17. Perform the indicated operations and simplify.

$$\frac{x+3}{x+5}-\frac{10}{x^2+5x}$$

A) $\dfrac{x-5}{x}$

B) $\dfrac{5}{x(x+1)}$

C) $x(x-2)$

D) $\dfrac{x-2}{x}$

E) $\dfrac{x-5}{x-2}$

Ans: D

18. Perform the indicated operations and simplify.

$$\frac{7a}{5x+10}+\frac{11a^2}{3x+6}$$

A) $\dfrac{35a+11a^2}{15(x+2)}$

B) $\dfrac{35a+33a^2}{30(x+1)}$

C) $\dfrac{35a+55a^2}{15(x+1)}$

D) $\dfrac{21a+55a^2}{15(x+2)}$

E) $\dfrac{7a+55a^2}{30(x+1)}$

Ans: D

19. Perform the indicated operations and simplify.

$$\frac{b-1}{b^2+2b}+\frac{b}{3b+6}$$

A) $\dfrac{b^2+3b}{3(b+2)}$

B) $\dfrac{(b+3)}{3b(b+2)}$

C) $\dfrac{(b-3)(b+3)}{3b(b+2)}$

D) $\dfrac{(b-3)}{3b(b+2)}$

E) $\dfrac{b^2+3b-3}{3b(b+2)}$

Ans: E

20. Perform the indicated operations and simplify.

$$\frac{2x+1}{4x-2}+\frac{2}{2x}-\frac{x+5}{2x^2-x}$$

A) $\dfrac{2x^2+3x-7}{x(2x-1)}$

B) $\dfrac{x^2+1x-12}{x(2x-1)}$

C) $\dfrac{2x^2+2x-10}{2x(2x-1)}$

D) $\dfrac{x^2+1x-5}{x(2x-1)}$

E) $\dfrac{2x^2+3x-12}{2x(2x-1)}$

Ans: E

21. Perform the indicated operations and simplify.

$$\frac{3x^2}{x^2-4}+\frac{2}{x^2-4x+4}-3$$

A) $\dfrac{7x-20}{(x-2)^2(x+2)}$

B) $\dfrac{14x-8}{(x-2)^2(x+2)}$

C) $\dfrac{14x-8}{(x-2)^2}$

D) $\dfrac{14x-20}{(x-2)^2(x+2)}$

E) $\dfrac{7x-20}{(x-2)^2}$

Ans: D

22. Perform the indicated operations and simplify.

$$\frac{3x^2(x+1)}{\sqrt{x^3+1}}+\sqrt{x^3+1}$$

A) $\dfrac{4x^3+3x^2+1}{\sqrt{x^3+1}}$

B) $\dfrac{3x^3+3x^2+3}{\sqrt{x^3+1}}$

C) $\dfrac{4x^3+1}{\sqrt{x^3+1}}$

D) $\dfrac{3x^3+3x^2+1}{\sqrt{x^3+1}}$

E) $\dfrac{6x^3+3x^2+3}{\sqrt{x^3+1}}$

Ans: A

23. Simplify the complex fraction.

$$\frac{5}{\frac{1}{6}+\frac{1}{6}}$$

A) 15
B) $\frac{1}{15}$
C) $\frac{5}{3}$
D) 8
E) $\frac{3}{5}$

Ans: A

24. Simplify the complex fraction.

$$\frac{\frac{5}{3y}+\frac{3}{y}}{\frac{1}{6}+\frac{1}{5y}}$$

A) $\frac{165}{5y+6}$
B) $\frac{165}{3y+10}$
C) $\frac{140}{5y+6}$
D) $\frac{140}{2y+15}$
E) $\frac{120}{3y+10}$

Ans: C

25. Simplify the complex fraction.

$$\frac{1-\dfrac{5}{x-5}}{x-12+\dfrac{22}{x+1}}$$

A) $\dfrac{x-10}{(x-1)(x+1)}$

B) $\dfrac{x+1}{x+12}$

C) $\dfrac{x-10}{(x-1)(x-5)}$

D) $\dfrac{x-10}{(x+12)(x-5)}$

E) $\dfrac{x+1}{(x-1)(x-5)}$

Ans: E

26. Simplify the complex fraction.

$$\frac{\sqrt{x-1}+\dfrac{1}{\sqrt{x-1}}}{x}$$

A) $\sqrt{x-1}$

B) $\dfrac{1}{\sqrt{x-1}}$

C) $\dfrac{1}{\sqrt{x-1}}$

D) $\dfrac{\sqrt{x-1}}{x}$

E) $x-1$

Ans: C

27. Simplify the complex fraction.

$$\frac{\sqrt{x^2+3}-\dfrac{x+5}{\sqrt{x^2+3}}}{x^2+5x+4}$$

A) $\dfrac{x^2-x+8}{(x+1)(x+4)\sqrt{x^2+3}}$

B) $\dfrac{(x-2)(x+1)}{(x+4)\sqrt{x^2+3}}$

C) $\dfrac{(x+4)}{(x-2)\sqrt{x^2+3}}$

D) $\dfrac{x-2}{(x+4)\sqrt{x^2+3}}$

E) $\dfrac{-x^2+x-2}{(4-x)\sqrt{x^2+3}}$

Ans: D

28. Rewrite the following so that only the positive exponents remain, and then simplify.

$\left(3^{-2}-3^{-1}\right)^{-1}$

A) $\dfrac{-2}{9}$

B) $\dfrac{2}{3}$

C) $\dfrac{-9}{2}$

D) $\dfrac{9}{2}$

E) $\dfrac{3}{2}$

Ans: C

29. Rewrite the following so that only the positive exponents remain, and then simplify.

$\left(6^2+8^2\right)^{-1/2}$

A) 14

B) 10

C) $\dfrac{1}{10}$

D) 100

E) $\dfrac{1}{14}$

Ans: C

30. Rewrite the following so that only the positive exponents remain, and then simplify.
$(3^2 + 2^2)^{-1}$

A) $\frac{1}{7}$

B) 13

C) $\frac{1}{11}$

D) $\frac{1}{13}$

E) 11

Ans: D

31. Rewrite the following so that only the positive exponents remain, and then simplify.
$\frac{x^{-2} + xy^{-2}}{(x^4 y)^{-2}}$

A) $y^4 + x^9$

B) $x^9\left(y^2 + x^3\right)$

C) $x^6\left(y^2 + x^3\right)$

D) $y^2 + x^9$

E) $x^6\left(y^3 + x^2\right)$

Ans: C

32. Rationalize the denominator of the fraction and simplify.
$\frac{3-\sqrt{x}}{3+\sqrt{x}}$

A) $\frac{9-6\sqrt{x}}{9-x}$

B) $\frac{9-6x+x^2}{3-x}$

C) $\frac{3-6\sqrt{x}+x}{3-x}$

D) $\frac{3-6x+x^2}{9-x}$

E) $\frac{9-6\sqrt{x}+x}{9-x}$

Ans: E

33. Rationalize the denominator of the fraction and simplify.

$$\frac{x-2}{x-\sqrt{2}}$$

A) $\dfrac{\sqrt{2}x^2+x-2\sqrt{2}}{x^2-2}$

B) $\dfrac{x^2-\left(\sqrt{2}+2\right)x-2\sqrt{2}}{x^2+2}$

C) $\dfrac{x^2+2\sqrt{2}\left(x-1\right)}{x^2+2}$

D) $\dfrac{x^2+\left(\sqrt{2}-1\right)x+2}{x^2-2}$

E) $\dfrac{x^2+\left(\sqrt{2}-2\right)x-2\sqrt{2}}{x^2-2}$

Ans: E

34. Rationalize the numerator of the fraction and simplify.

$$\frac{\sqrt{16+7h}-4}{h}$$

A) $\dfrac{7h}{4h+\sqrt{16+7h}}$

B) $\dfrac{7}{4+\sqrt{16+7h}}$

C) $\dfrac{7h-16}{7+\sqrt{16+7h}}$

D) $\dfrac{16+7h}{4+\sqrt{16+7h}}$

E) $\dfrac{16}{7+\sqrt{16+7h}}$

Ans: B

35. Two thin lenses with focal lengths *s* and *r* and separated by a distance *d* have their combined focal length given by the reciprocal of $\frac{1}{s}+\frac{1}{r}-\frac{d}{sr}$. Combine the fractions in the expression above and use the reciprocal of your result to find the combined focal length.

A) $\frac{sr+s-d}{r}$

B) $\frac{sr}{r+s-d}$

C) $\frac{sr+1-d}{sr}$

D) $\frac{r+s-d}{sr}$

E) $\frac{r}{sr+s-d}$

Ans: B

36. A company's average cost per unit when *x* units are produced is defined to be $\text{Average cost}=\frac{\text{Total cost}}{x}$. Suppose a company's average costs are given by $\text{Average cost}=\frac{3000}{x}+45+0.3x$. Express the average cost as a single fraction.

A) $\frac{3000+45x+0.3x^2}{x^2}$

B) $\frac{3045+0.3x}{x}$

C) $\frac{3000+45.3x}{x}$

D) $\frac{3000+45x+0.3x^2}{x}$

E) $\frac{3000+45x+0.3x^3}{x}$

Ans: D

37. A company's average cost per unit when x units are produced is defined to be $\text{Average cost} = \dfrac{\text{Total cost}}{x}$. Suppose a company's average costs are given by $\text{Average cost} = \dfrac{4000}{x} + 48 + 0.7x$. Choose the expression that gives the company's total costs.

A) $\dfrac{4000 + 48x + 0.7x^2}{x^2}$

B) $\dfrac{4000}{x} + 48 + 0.7x$

C) $\dfrac{4000 + 48x + 0.7x}{x}$

D) $4000 + 48x + 0.7x^2$

E) $4000x + 48x^2 + 0.7x^3$

Ans: D

38. A company's average cost per unit when x units are produced is defined to be $\text{Average cost} = \dfrac{\text{Total cost}}{x}$. Suppose a company's average costs are given by $\text{Average cost} = \dfrac{32000}{x} + 92 + 0.4x$. Express the average cost as a single fraction.

A) $\dfrac{32000 + 92x + 0.4x^3}{x}$

B) $\dfrac{32092 + 0.4x}{x}$

C) $\dfrac{32000 + 92x + 0.4x^2}{x}$

D) $\dfrac{32000 + 92.4x}{x}$

E) $\dfrac{32000 + 92x + 0.4x^2}{x^2}$

Ans: C

39. Suppose that a company's daily sales volume attributed to an advertising campaign is given by Sales volume $= 1 + \frac{2}{t+2} - \frac{8}{(t+2)^2}$, where t is the number of days since the campaign started. Express the sales volume as a single fraction.

A) $\frac{t^2+4t}{(t+2)^2}$

B) $\frac{t+6}{(t+2)^2}$

C) $\frac{t^2+6t}{(t+2)^2}$

D) $\frac{t+2}{(t+2)^2}$

E) $\frac{t^2+2t}{(t+2)^2}$

Ans: C

40. The formula for the future value of an annuity due involves the expression $\frac{(5+i)^{n+1}-5}{i} - 1$. Write this expression over a common denominator and factor the numerator to simplify.

A) $\frac{(5+i)\left[(5+i)^{n+1}-i\right]}{i}$

B) $\frac{(5+i)\left[(5+i)^{n}-1\right]}{i}$

C) $\frac{(5+i)^{n}-i}{i}$

D) $\frac{(5+i)^{n}-1}{i}$

E) $\frac{(5+i)\left[(5+i)^{n+1}-1\right]}{i}$

Ans: B

