1. Evaluate.

$$(5)|3+4(2-5)|$$
$$= 5|3+4(-3)|$$
$$= 5|3-12|$$
$$= 5|-9|$$
$$= 5 \cdot 9 = 45$$

    A. 155

    B. 105

    C. 45

    D. 75

    E. None of the above.

2. Simplify. Do not leave negative exponents in your answer.

$$(-2a^3b^2)\left(\frac{ab^{-4}}{a^{-3}}\right)^3$$
$$= -2a^3b^2\left(\frac{a\,a^3}{b^4}\right)^3 = -2a^3b^2\left(\frac{a^4}{b^4}\right)^3$$
$$= \frac{-2a^3b^2}{1} \cdot \frac{a^{12}}{b^{12}} = \frac{-2a^{15}b^2}{b^{12}}$$
$$= -2a^{15}b^{2-12} = \frac{-2a^{15}}{b^{10}}$$

    A. $\dfrac{a^9}{2b^2}$

    B. $-\dfrac{2a^{15}}{b^{10}}$

    C. $-2a^6b$

    D. $\dfrac{a^{10}}{2b^5}$

    E. None of the above.

3.   Simplify.

$$(-2)^{-3} + 3^2$$
$$= \frac{1}{(-2)^3} + 3^2$$
$$= \frac{1}{-8} + 9$$
$$= -\frac{1}{8} + \frac{72}{8} = \frac{71}{8}$$

    A. $\dfrac{71}{8}$

    B. 1

    C. $\dfrac{73}{8}$

    D. -1

    E. None of the above.

4.   Rationalize the denominator and simplify.

$$\sqrt{\frac{xy}{3x^2y^3}}$$ **I recommend simplifying first, then rationalizing.**

$$=\sqrt{\frac{1}{3xy^2}}$$

$$=\frac{\sqrt{1}}{\sqrt{y^2 \cdot 3x}}$$

$$=\frac{1}{y\sqrt{3x}} \cdot \frac{\sqrt{3x}}{\sqrt{3x}}$$

$$=\frac{\sqrt{3x}}{y(3x)} = \frac{\sqrt{3x}}{3xy}$$

A. $\dfrac{1}{3xy^2}$

B. $\dfrac{\sqrt{3xy^2}}{9x^2y^4}$

C. $\dfrac{1}{9x^2y^4}$

D. $\dfrac{\sqrt{3x}}{3xy}$

E. $3xy^2$

5.   Perform the indicated operations and express as a polynomial.

$$(2x - 1)(x + 3) - (x^2 + 3x - 5)$$
$$= (2x^2 + 6x - x - 3) - (x^2 + 3x - 5)$$
$$= (2x^2 + 5x - 3) - (x^2 + 3x - 5) \quad \text{Distribute } -1.$$
$$= 2x^2 + 5x - 3 - x^2 - 3x + 5$$
$$= x^2 + 2x + 2$$

A. $x^2 + 8x - 8$

B. $x^2 + 5x - 8$

C. $x^2 + 3x + 2$

D. $x^2 + 2x + 2$

E. None of the above.

6.   Which of the following is a factor of $12x^2 - 5x - 3$?
Using the 'ac' method: $ac = (12)(-3) = -36$ $b = -5$
The pair of numbers that multiplies to -36 and adds to -5 is the pair $-9 \; and \; 4$.
$12x^2 - 5x - 3$

$$= 12x^2 - 9x + 4x - 3$$
$$= 3x(4x - 3) + 1(4x - 3)$$
$$= (4x - 3)(3x + 1)$$

A. $4x + 1$

B. $3x - 1$

C. $2x + 3$

D. $6x - 1$

E. $4x - 3$

7. Factor $x^4 - 16y^{12}$ completely.   The 'difference of squares' pattern is used twice.

$= (x^2 + 4y^6)(x^2 - 4y^6)$

$= (x^2 + 4y^6)(x + 2y^3)(x - 2y^3)$

     A. $(x^2 - 4y^6)^2$

     B. $(x^2 + 4y^6)(x + 2y^3)(x - 2y^3)$

     C. $(x^2 + 4y^6)^2(x^2 - 4y^6)^2$

     D. $(x^2 + 4y^6)(x - 2y^3)^2$

     E. $(x - 2y^3)^4$

8. Simplify.

$$\frac{x}{x+4} - \frac{5}{x-4} + \frac{2x}{x^2-16}$$

$$= \frac{x}{(x+4)} - \frac{5}{(x-4)} + \frac{2x}{(x+4)(x-4)} \qquad \text{LCD} = (x+4)(x-4)$$

$$= \frac{x(x-4)}{(x+4)(x-4)} - \frac{5(x+4)}{(x+4)(x-4)} + \frac{2x}{(x+4)(x-4)}$$

$$= \frac{x(x-4) - 5(x+4) + 2x}{(x+4)(x-4)}$$

$$= \frac{x^2 - 4x - 5x - 20 + 2x}{(x+4)(x-4)}$$

$$= \frac{x^2 - 7x - 20}{(x+4)(x-4)}$$

     A. $\dfrac{x^2-7x-20}{(x+4)(x-4)}$

     B. $\dfrac{3x-5}{(x+4)(x-4)}$

     C. $\dfrac{x^2-5x+20}{(x+4)(x-4)}$

     D. $\dfrac{x^2+x+20}{(x+4)(x-4)}$

     E.   None of the above.

9. Simplify.

$$\frac{x^2+3x-4}{x^2-1} \cdot \frac{2x^2-x-3}{x^2+8x+16}$$

$$= \frac{(x+4)(x-1)}{(x+1)(x-1)} \cdot \frac{(2x-3)(x+1)}{(x+4)^2}$$

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

     A. $\dfrac{2x-3}{x+4}$

     B. $\dfrac{x+1}{x-4}$

     C. $\dfrac{(2x-3)(x+1)}{(x-1)(x-4)}$

     D. $\dfrac{x-3}{x+2}$

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

10. Simplify.

$$\frac{(x+h)^2+3-(x^2+3)}{h}$$

$$=\frac{x^2+2xh+h^2+3-x^2-3}{h}$$

$$=\frac{2xh+h^2}{h}$$

$$=\frac{h(2x+h)}{h}=2x+h$$

A. h

B. $\dfrac{h^2+6}{h}$

C. $\dfrac{2xh+h^2+6}{h}$

D. $2x+h$ (circled)

E. None of the above.

11. Solve the following equation. Choose the answer that best describes the solution.

$$\frac{1}{4}(2x+1)=\frac{1}{2}(3x+1)$$

Distribute through the parentheses.

$$\frac{2}{4}x+\frac{1}{4}=\frac{3}{2}x+\frac{1}{2} \quad \text{Multiply both sides by the LCD of 4.}$$

$$4\left(\frac{2}{4}x+\frac{1}{4}\right)=4\left(\frac{3}{2}x+\frac{1}{2}\right)$$

$$2x+1=6x+2$$

$$-1=4x$$

$$-\frac{1}{4}=x$$

A. x is less than -2

B. x is between -2 and 0 (circled)

C. x is between 0 and 2

D. x is greater than 2

E. There is no solution for x

12. Solve $\dfrac{1}{w}=\dfrac{1}{p}+\dfrac{2}{3}$ for p.

$\text{LCD}=3pw$

$$3pw\left(\frac{1}{w}\right)=3pw\left(\frac{1}{p}+\frac{2}{3}\right)$$

$$3p=3w+2pw$$

$$3p-2pw=3w$$

$$p(3-2w)=3w$$

$$p=\frac{3w}{3-2w}$$

A. $p=\dfrac{2w-3}{2}$

B. $p=\dfrac{w}{2w+3}$

C. $p=\dfrac{3w}{3-2w}$ (circled)

D. $p=\dfrac{2-3w}{3}$

E. $p=\dfrac{3(1-w)}{w}$

13. Four hundred people attended a school play. Adult tickets cost $4 and children tickets were $2. School receipts totaled $1,400 for the play. If x represents the number of adult tickets purchased, find the equation that would be used to find x. $400 - x$ = number of children tickets

PLAN: adult revenue + children revenue = total revenue

$$4x + 2(400 - x) = 1400$$

A. $4x + 2x = 1400$

B. $4(400 - x) + 2x = 1400$

C. $4x + 2(x - 400) = 1400$

D. $4(x - 400) + 2x = 1400$

E. $4x + 2(400 - x) = 1400$

14. A lawyer's time is billed at $70 per hour. The research assistant, who really does all the work, is billed at $\frac{4}{5}$ of this amount per hour. A recent client who received a bill for $975 knows that the assistant worked one hour more than twice the number of hours worked by the lawyer. Find the number of hours that the lawyer worked, and round your answer to the nearest whole number.

assistant's billing rate = $\frac{4}{5}(70) = \$56$ h = number of hours for lawyer

$2h + 1$ = number of hours for assistant

PLAN: amount billed by lawyer + amount billed by assistant = bill

$$70h + 56(2h + 1) = 975$$

$$70h + 112h + 56 = 975$$

$$182h = 919$$

$$h \approx 5$$

A. 3 hours

B. 5 hours

C. 7 hours

D. 14 hours

E. None of the above.

15. A truck and a car are 155 miles apart on a straight road. The car starts driving towards the truck at 60 mph. Thirty minutes later, the truck starts driving towards the car at 40 mph. How long after the car starts driving will they meet?

	Distance (miles)	Rate (mph)	Time (hours)
Truck	40(x - ½)	40	x - ½
Car	60x	60	x

PLAN: distance for truck + distance for car = 155 miles

$$40\left(x - \frac{1}{2}\right) + 60x = 155$$

$$40x - 20 + 60x = 155$$

$$100x = 175$$

$$x = 1.75 \text{ hours}$$

1 hour + (0.75)(60) minutes

= 1 hour 45 minutes

A. 1 hour and 35 minutes

B. 2 hours and 15 minutes

C. 1 hour and 45 minutes

D. 2 hours and 3 minutes

E. 1 hour and 55 minutes