

Chapter 4 Practice

Disclaimer: The actual exam differs

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Simplify the expression.

1) $5x^0$

1) 5

$$5x^0 = 5 \cdot 1 = 5$$

NOTE that only x has an exponent of zero

2) $(-7)^0 - (-7)^1$

2) 8

$$\begin{aligned} & (-7)^0 - (-7)^1 \\ = & 1 - (-7) \end{aligned}$$

$$= 1 + 7$$

$$= 8$$

Express using positive exponents. Then, if possible, simplify.

3) $\left(\frac{1}{3}\right)^{-4} =$

3) 81

$$\left(\frac{1}{3}\right)^{-4} = 3^4 = 81$$

ALWAYS simplify the exponential expression
UNLESS IT IS TOO LARGE A NUMBER
(LIKE OVER ONE BILLION)

4) $\frac{1}{x^{-6}}$ No need to show work.

4) x^6

$$\frac{1}{x^{-6}} = x^6$$

Never Leave negative exponents in your answer unless it is in scientific notation

Simplify. Do not use negative exponents in your answer.

5) $y^{-6} \cdot y^{-4}$

$$y^{-6} \cdot y^{-4} = y^{-6 + -4} = y^{-10} = \frac{1}{y^{10}}$$

5) $\frac{1}{y^{10}}$

Convert to decimal notation.

6) 1.331×10^4 No need to show work

$$1.331 \times 10^4 = 1.3310 = 13,310$$

6) 13,310

Perform the indicated operation. Write the answer in scientific notation.

7) $(5.2 \times 10^{-3})(8.2 \times 10^9)$

$$(5.2)(8.2) \times 10^{-3} \cdot 10^9$$
$$42.64 \times 10^6 \text{ (NOT yet in scientific notation)}$$
$$4.264 \times 10^7 \text{ (DO NOT round)}$$

7) 4.264×10^7

Evaluate the polynomial.

8) $-2x^3 - 6x^2 - 9$ for $x = -3$

$$-2(-3)^3 - 6(-3)^2 - 9$$
$$= -2(-27) - 6(9) - 9 = -2(-27) - 6(9) - 9$$
$$54 - 6(9) - 9 = 54 - 54 - 9 = 0 - 9 = -9$$

8) -9

Add.

$$9) \frac{3}{4}x^2 - \frac{5}{8}x + \frac{2}{5}$$

$$\frac{1}{6}x^2 - \frac{3}{4}x + \frac{1}{10}$$

$$\left(\frac{9}{12} + \frac{2}{12}\right)x^2 - \left(\frac{5}{8} + \frac{6}{8}\right)x + \frac{4}{10} + \frac{1}{10}$$

$$= \frac{11}{12}x^2 - \frac{11}{8}x + \frac{5}{10} \leftarrow \text{reduce!}$$

$$= \frac{11}{12}x^2 - \frac{11}{8}x + \frac{1}{2}$$

Note: Write the variable EITHER next to the fraction bar or in the numerator, NOT in the denominator.

$$9) \frac{11}{12}x^2 - \frac{11}{8}x + \frac{1}{2}$$

Subtract.

$$10) (8n^6 + 19n^4 - 4) - (-3n^4 + 6n^6 - 20)$$

$$8n^6 + 19n^4 - 4 + 3n^4 - 6n^6 + 20$$

$$2n^6 + 22n^4 + 16$$

↑ write in descending order!

$$10) 2n^6 + 22n^4 + 16$$

Multiply.

$$11) (13 + m)(13 - m)$$

$$= 13 \cdot 13 - 13 \cdot m + 13 \cdot m - m^2$$

$$169 - m^2$$

or

$$-m^2 + 169$$

Write in either descending or ascending order

$$11) \frac{169 - m^2}{\text{or}} -m^2 + 169$$

NOTE: can also use shortcut

$$(a+b)(a-b) = a^2 - b^2$$

12) $(p+11q)(p-11q)$

$$p^2 - (11q)^2$$

$$= p^2 - 121q^2$$

Use shortcut: $(a+b)(a-b) = a^2 - b^2$

12)

$$p^2 - 121q^2$$

Simplify. Assume that no denominator is zero and that 0^0 is not considered.

13) $9^8 \cdot 9^9$

$$a^m \cdot a^n = a^{m+n}$$

$$9^8 \cdot 9^9 = 9^{8+9} = 9^{17} \quad (\text{Leave in exponential form too large to expand!})$$

13)

$$9^{17}$$

14) $(y-5)^7(y-5)^8$

$$(y-5)^7(y-5)^8 = (y-5)^{7+8} = (y-5)^{15}$$

CAUTION: must have parentheses and cannot distribute the exponent to terms (only factors)

14)

$$(y-5)^{15}$$

15) $(pq^3)(pq)^4$

$$(pq^3)(pq)^4 = pq^3 \cdot p^4q^4 = p \cdot p^4 \cdot q^3q^4$$

$$= p^{1+4}q^{3+4} = p^5q^7$$

15)

$$p^5q^7$$

16) $5^5 \cdot 5^4 \cdot 5^5$

$$= 5^{5+4+5} = 5^{14} \quad (\text{Too large to expand - Leave in exponential form})$$

16)

$$5^{14}$$

17) $\frac{40x^7}{-4x^5}$

$$= \frac{40}{-4} \cdot \frac{x^7}{x^5} = -10x^{7-5} = -10x^2$$

17)

$$-10x^2$$

note $\frac{x^a}{x^b} = x^{a-b}$

$$18) \frac{24m^2p^2}{8m^8p} = \frac{24}{8} \cdot \frac{m^2}{m^8} \cdot \frac{p^2}{p} = 3m^{-6}p^1 = \frac{3p}{m^6}$$

$$18) \frac{3p}{m^6}$$

ALWAYS RESOLVE negative exponents (UNLESS USING SCIENTIFIC NOTATION)

Simplify the expression.

$$19) -(9^0) + (-2)^0$$

$$-(1) + 1 = 0$$

$$19) \underline{0}$$

Simplify.

$$20) (-3a^5)^3 = (-3)^3 (a^5)^3 = -27a^{15}$$

Simplify $(-3)^3$ TO -27

$$20) \underline{-27a^{15}}$$

$$21) (w^7z)^3(w^4z^3) = w^{21}z^3w^4z^3 = w^{25}z^6$$

$$21) \underline{w^{25}z^6}$$

Simplify. Assume that no denominator is zero and that 0^0 is not considered.

$$22) \left(\frac{x^4}{y^4z^7} \right)^4 = \frac{x^{16}}{y^{16}z^{28}}$$

$$22) \underline{\frac{x^{16}}{y^{16}z^{28}}}$$

$$23) \left(\frac{a^5}{-5b^2} \right)^4 = \frac{a^{20}}{625b^8}$$

$$23) \underline{\frac{a^{20}}{625b^8}}$$

NOTE: SIMPLIFY $(-5)^4$ TO 625

Express using positive exponents. Then, if possible, simplify.

$$24) \left(\frac{3}{4}\right)^{-3} = \left(\frac{4}{3}\right)^3 = \frac{4^3}{3^3} = \frac{64}{27}$$

$$24) \frac{64}{27}$$

Simplify. Do not use negative exponents in your answer.

$$25) (x^{-5}y^{-4})(x^8y^{-7})$$

$$= x^{-5}x^8 y^{-4}y^{-7}$$

$$= x^3 y^{-11} = \frac{x^3}{y^{11}} \quad (\text{Do not leave negative exponents})$$

$$25) \frac{x^3}{y^{11}}$$

$$26) 3^{-6} \cdot 3^7 = 3^1 = 3$$

$$26) 3$$

$$27) \frac{y^{-11}}{y^4} = y^{-11-4} = y^{-15} = \frac{1}{y^{15}}$$

$$27) \frac{1}{y^{15}}$$

RESOLVE negative exponents

$$28) \frac{7x^{-5}}{y^{-2}z^4} = \frac{7y^2}{x^5z^4}$$

$$28) \frac{7y^2}{x^5z^4}$$

RESOLVE negative exponents

$$29) (2xy)^{-2} = \frac{1}{(2xy)^2} = \frac{1}{4x^2y^2}$$

$$29) \frac{1}{4x^2y^2}$$

RESOLVE negative exponents

37) $-14c^6 + 4c^5 + 4c^4$

TRINOMIAL Because there are 3 terms

37) TRINOMIAL

Combine like terms. Write the answer in descending order.

38) $8p^5 - 3p^3 - 4p^5 + 6p^3$

$= 4p^5 + 3p^3$

38) $4p^5 + 3p^3$

Solve the problem.

39) The area of a circle of radius r is given by the polynomial πr^2 , where π is an irrational number. Use 3.14 as an approximation of π , and find the area of a circle with radius 4 cm.

Area = $3.14(4)^2 \text{ cm}^2$
 $= 3.14(16) \text{ cm}^2$
 $= 50.24 \text{ cm}^2$

39) 50.24 cm^2

40) The position of an object moving in a straight line is given by $s = 10t^2 - 4t$, where s is in meters and t is the time in seconds the object has been in motion. How far will an object move in 14 seconds?

$s = 10t^2 - 4t$
 $s = 10(14)^2 - 4(14)$ METERS
 $= 10(196) - 4(14)$
 $= 1960 - 4(14)$
 $1960 - 56$
 $= 1904 \text{ METERS}$

40) 1904 meters

Add.

41) $(-2 - 5x^4 + 8x^6 - 7x^5) + (-2x^5 - 7x^4 - 6 + 3x^6)$ add LIKE terms

$16x^6 - 9x^5 - 12x^4 - 8$
 put in descending order

41) $16x^6 - 9x^5 - 12x^4 - 8$

Multiply.

42) $\left(-\frac{1}{5}x^5\right)\left(-\frac{1}{8}x^4\right) = \frac{1}{40}x^9$ or $\frac{x^9}{40}$

42) $\frac{x^9}{40}$

$$43) -3x^7(-10x^7 - 7x^4) \quad \text{DISTRIBUTE}$$

$$= -3x^7(-10x^7) - 3x^7(-7x^4)$$

$$= 30x^{14} + 21x^4$$

$$43) \frac{\quad}{30x^{14} + 21x^4}$$

$$44) \frac{3}{8}w^8 \left(6w^6 + 4w^4 - \frac{9}{7} \right) \quad \text{DISTRIBUTE}$$

$$\frac{3}{8}w^8(6w^6) + \frac{3}{8}w^8(4w^4) + \frac{3}{8}w^8\left(-\frac{9}{7}\right)$$

$$= \frac{9}{4}w^{14} + \frac{3}{2}w^{12} - \frac{27}{56}w^8$$

$$44) \frac{\quad}{\frac{9}{4}w^{14} + \frac{3}{2}w^{12} - \frac{27}{56}w^8}$$

$$45) (3x+5)(x-6) \quad \text{FOIL}$$

$$3x^2 - 18x + 5x - 30 \quad \text{COMBINE LIKE TERMS}$$

$$= 3x^2 - 13x - 30$$

$$45) \frac{\quad}{3x^2 - 13x - 30}$$

$$46) \left(x - \frac{5}{4}\right)\left(x + \frac{4}{5}\right) \quad \text{FOIL}$$

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

$$x^2 + \frac{16}{20}x - \frac{25}{20}x - 1 = x^2 - \frac{9}{20}x - 1$$

$$46) \frac{\quad}{x^2 - \frac{9}{20}x - 1}$$

$$47) (x-4)(7x^2+x+9)$$

$$= x \cdot 7x^2 + x \cdot x + x \cdot 9 - 4(7x^2) - 4 \cdot x - 4(9)$$

$$= 7x^3 + x^2 + 9x - 28x^2 - 4x - 36$$

$$= 7x^3 - 27x^2 + 5x - 36$$

$$47) \frac{\quad}{7x^3 - 27x^2 + 5x - 36}$$

$$48) (4x-3)(4x+3) \quad \text{FOIL}$$

$$16x^2 + 12x - 12x + 9 = 16x^2 - 9$$

OR USE SHORTCUT $(a+b)(a-b) = a^2 - b^2$

$$48) \frac{\quad}{16x^2 - 9}$$

$$49) (8m+7)^2 = 64m^2 + 2(7)(8m) + 49$$

$$= 64m^2 + 112m + 49$$

$$49) \frac{\quad}{64m^2 + 112m + 49}$$

Use $(a+b)^2 = a^2 + 2ab + b^2$

OR

FOIL: $(8m+7)(8m+7) = 64m^2 + 112m + 49$

Evaluate as requested.

50) Evaluate the polynomial $2x^2 - y^2 + 2xy$ for $x = -2$ and $y = -6$.

$$\begin{aligned} &= 2(-2)^2 - (-6)^2 + 2(-2)(-6) && 8 - 36 + 24 \\ &= 2(4) - (36) + 2(-2)(-6) && = -4 \\ &= 8 - 36 + 2(-2)(-6) \end{aligned}$$

50) -4

Add or subtract, as indicated.

51) $(4x^2y - 3xy) - (2x^2y - 5xy^2) - (5xy - 2xy^2)$

$$\begin{aligned} &4x^2y - 3xy - 2x^2y + 5xy^2 - 5xy + 2xy^2 \\ &= 2x^2y + 7xy^2 - 8xy \end{aligned}$$

51)

$$2x^2y + 7xy^2 - 8xy$$

Multiply.

52) $(xy + 4)(9xy - 2)$

FOIL

$$\begin{aligned} &9x^2y^2 - 2xy + 36xy - 8 \quad \text{combine like terms} \\ &= 9x^2y^2 + 34xy - 8 \end{aligned}$$

52) 9x²y² + 34xy - 8

53) $(9x + 4y)^2 = 81x^2 + 2(9x)(4y) + 16y^2$
 $81x^2 + 72xy + 16y^2$

use $(a+b)^2 = a^2 + 2ab + b^2$

53)

$$81x^2 + 72xy + 16y^2$$

Perform the indicated operation.

54) $\frac{8x^4 - 5x^3 - 3x^2}{x^2} = \frac{8x^4}{x^2} - \frac{5x^3}{x^2} - \frac{3x^2}{x^2} =$
 $8x^2 - 5x - 3$

54)

$$8x^2 - 5x - 3$$

55) $\frac{20x^1 - 28x^{-2}}{-4x^{-5}} = \frac{20x}{-4x^{-5}} - \frac{28x^{-2}}{-4x^{-5}}$
 $= -5x^{1-(-5)} + 7x^{-2-(-5)}$
 $= -5x^6 + 7x^3$

55)

$$-5x^6 + 7x^3$$

Everything on this page requires long division

Divide.

56) $(x^2 + 6x - 27) \div (x + 9)$

$$\begin{array}{r} x-3 \\ x+9 \overline{) x^2 + 6x - 27} \\ \underline{-(x^2 + 9x)} \downarrow \\ -3x - 27 \\ \underline{-(-3x - 27)} \\ 0 \end{array}$$

zero remainder

56) $x-3$

57) $(p^2 + 4p - 6) \div (p + 6)$

$$\begin{array}{r} p-2 + \frac{6}{p+6} \\ p+6 \overline{) p^2 + 4p - 6} \\ \underline{-(p^2 + 6p)} \downarrow \\ -2p - 6 \\ \underline{-(-2p - 12)} \\ 6 \end{array}$$

6 ← remainder

57) _____

$p-2 + \frac{6}{p+6}$

58) $\frac{x^2 - 7}{x - 3}$

$$\begin{array}{r} x+3 + \frac{2}{x-3} \\ x-3 \overline{) x^2 + 0x - 7} \\ \underline{-(x^2 - 3x)} \downarrow \\ 3x - 7 \\ \underline{-(3x - 9)} \\ 2 \end{array}$$

← (notice we needed a place holder for the "missing term")

2 ← remainder

58) _____

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

Answer Key

Testname: 115CH4V2P

1) \emptyset 5

2) 8

3) 81

4) x^6

5) $\frac{1}{y^{10}}$

6) 13,310

7) 4.264×10^7

8) -9

9) $\frac{11}{12}x^2 - \frac{11}{8}x + \frac{1}{2}$

10) $2n^6 + 22n^4 + 16$

11) $169 - m^2$

12) $p^2 - 121q^2$

13) 917

14) $(y - 5)^{15}$

15) p^5q^7

16) 5^{14}

17) $-10x^2$

18) $\frac{3p}{m^6}$

19) 0

20) $(-3)^3a^{15}$

21) $w^{25}z^6$

22) $\frac{x^{16}}{y^{16}z^{28}}$

23) $\frac{a^{20}}{625b^8}$

24) $\frac{64}{27}$

25) $\frac{x^3}{y^{11}}$

26) 3

27) $\frac{1}{y^{15}}$

28) $\frac{7y^2}{x^5z^4}$

29) $\frac{1}{4x^2y^2}$

Answer Key

Testname: 115CH4V2P

$$30) \frac{27m^9}{n^{15}}$$

$$31) \frac{w^5z^{30}}{x^{25}y^{25}}$$

$$32) 16,330,000$$

$$33) 8.1 \times 10^4$$

$$34) 8.157 \times 10^{-6}$$

$$35) 4.3 \times 10^{-11}$$

$$36) \text{Binomial}$$

$$37) \text{Trinomial}$$

$$38) 4p^5 + 3p^3$$

$$39) 50.24 \text{ cm}^2$$

$$40) 1904 \text{ meters}$$

$$41) 11x^6 - 9x^5 - 12x^4 - 8$$

$$42) \frac{1}{40}x^9$$

$$43) 30x^{14} + 21x^{11}$$

$$44) \frac{9}{4}w^{14} + \frac{3}{2}w^{12} - \frac{27}{56}w^8$$

$$45) 3x^2 - 13x - 30$$

$$46) x^2 - \frac{9}{20}x - 1$$

$$47) 7x^3 - 27x^2 + 5x - 36$$

$$48) 16x^2 - 9$$

$$49) 64m^2 + 112m + 49$$

$$50) -4$$

$$51) 2x^2y + 7xy^2 - 8xy$$

$$52) 9x^2y^2 + 34xy - 8$$

$$53) 81x^2 + 72xy + 16y^2$$

$$54) 8x^2 - 5x - 3$$

$$55) -5x^6 + 7x^3$$

$$56) x - 3$$

$$57) p - 2 + \frac{6}{p + 6}$$

$$58) x + 3 + \frac{2}{x - 3}$$