



## MATH 101 CCE — SAMPLE EXAMINATION

This test will be most valuable to you if you work the problems with a time limit and without books, notes or supplementary aids. Check your answers with the “Solutions” which follow. Write out all steps of your solutions so you can compare them with the Solution key.

- Which of the following is equal to 54?
  - $5.4 \times 1000 =$
  - $0.54 \div 10 =$
  - $0.54 \div .001 =$
  - $4.8 \div 6 =$
  - $.01 \times 5400 =$

Circle your selected answer.

- Subtract  $\frac{2}{3} + \frac{1}{4}$  from  $\frac{7}{6}$ . Multiply the result by  $\frac{2}{3}$ .
- Find the product of  $5\frac{1}{3}$  and  $2\frac{1}{5}$ . Divide the product by  $1\frac{1}{15}$ .
- Subtract 2 from the quotient obtained from  $10\frac{2}{5} \div 4\frac{1}{3}$ .
- Find the value of  $4\left[\frac{4}{5} - \left(-\frac{1}{5}\right) + \frac{1}{3}\left(\frac{5}{6} - \frac{1}{12}\right)\right]$ .
- Convert .0063 to a percent. \_\_\_\_\_
  - Convert  $\frac{2}{3}\%$  to a simple fraction. \_\_\_\_\_
  - Convert  $\frac{11}{5}$  to a percent. \_\_\_\_\_

7. (a) A man made 12.3% profit on a \$12,000 investment. What was the dollar value of his profit?
- (b) In a class of 55 students, 11 students made “A” on an exam. What percent did not make an “A” grade?
8. Complete the table

Fraction	Decimal	Percent
$2\frac{3}{4}$		
	.0046	
		7.1%
$\frac{7}{8}$		
	16.0	
		232%

9. Add  $8x^4 - 3x^2 + 10$  and  $x^4 + x^2 - x$ .
10. Subtract  $(-2x^2y - 7xy)$  from  $5x^2y - 3xy$ .
11. Simplify and combine like terms.  
 $(2x^2 - 3y)3x - 2x(x^2 + 3y)$
12. Find the quotient  $(2x^3 - 10x^2 + 14x - 6) \div (2x - 6)$ .

Solve the equations.

13.  $2(a - 3) = 4 + (a - 14)$
14.  $7(b - 1) + 3(b - 4) = 2(b + 1) - 4(2b + 3)$
15.  $\frac{9x}{4} - \frac{13}{6} = \frac{11x}{8}$

Perform the indicated operations and simplify.

16.  $(a^2 + b^2) - (a + b)^2$

Solve simultaneously the system of equations.

17. 
$$\begin{aligned} 6x - 7y &= -20 \\ 2x - 3y + 8 &= 0 \end{aligned}$$

18. 
$$\begin{aligned} \frac{3}{4}x - \frac{2}{3}y &= 5 \\ \frac{1}{2}x + \frac{y}{3} &= 1 \end{aligned}$$

19. The sum of three numbers is 28. The first number is three less than the second, and the third number is seven more than the first. Find these numbers.

20. One train is 18 m.p.h. faster than another. If they depart from a terminal at the same time and travel in opposite directions, they will be 168 miles apart at the end of two hours. Find the speed of each train.

### ANSWER KEY FOR SAMPLE EXAMINATION

1. (a)  $5.4 \times 1000 = 5400.0$  (No)  
(b)  $0.54 \div 10 = \frac{.54}{10} = .054$  (No)  
(c)  $0.54 \div .001 = \frac{.54}{.001} = 540$  (No)  
(d)  $4.8 \div 6 = \frac{4.8}{6} = .8$  (No)  
(e)  $.01 \times 5400 = 54.00 = 54$  (Yes)

2. 
$$\begin{aligned} \frac{7}{6} - \left(\frac{2}{3} + \frac{1}{4}\right) &= \frac{7}{6} - \frac{11}{12} = \frac{14}{12} - \frac{11}{12} = \frac{3}{12} = \frac{1}{4} \\ \frac{1}{4} \times \frac{2}{3} &= \frac{2}{12} = \frac{1}{6} \end{aligned}$$

3. 
$$\begin{aligned} 5\frac{1}{3} \times 2\frac{1}{5} \div 1\frac{1}{15} &= \frac{16}{3} \times \frac{11}{5} \div \frac{16}{15} \\ &= \frac{16}{3} \times \frac{11}{5} \times \frac{15}{16} = \frac{\cancel{16} \times 11 \times \cancel{15}}{\cancel{3} \times \cancel{5} \times \cancel{16}} = \frac{11}{1} = 11 \end{aligned}$$

4. 
$$\begin{aligned} 10\frac{2}{5} \div 4\frac{1}{3} - 2 &= \frac{52}{5} \div \frac{3}{13} - 2 = \frac{52}{5} \times \frac{3}{13} - 2 \\ &= \frac{4 \cdot \cancel{13} \times 3}{5 \cdot \cancel{13}} - 2 = \frac{12}{5} - 2 = \frac{12}{5} - \frac{10}{5} = \frac{2}{5} \end{aligned}$$

$$5. \quad 4 \left[ \frac{4}{5} - \left( -\frac{1}{5} \right) + \frac{1}{3} \left( \frac{5}{6} - \frac{1}{12} \right) \right] = 4 \left[ \frac{4}{5} + \frac{1}{5} + \frac{1}{3} \left( \frac{9}{12} \right) \right]$$

$$= 4 \left[ 1 + \frac{3}{12} \right] = 4 \left[ 1 + \frac{1}{4} \right] = 4 \left[ \frac{5}{4} \right] = 5$$

6. (a)  $.0063 = .63\%$

(b)  $\frac{2}{3}\% = \frac{2}{3} \left( \frac{1}{100} \right) = \frac{2}{300} = \frac{1}{150}$

(c)  $\frac{11}{5} = 2.2 = 220\%$

7. (a)  $\$12,000 \times .123 = \$1476$  profit.

(b)  $\frac{11}{55} = .20 = 20\%$  made "A" grade.

$100\% - 20\% = 80\%$  did not make "A" grade.

8.

Fraction	Decimal	Percent
$2\frac{3}{4}$	2.75	275%
$\frac{23}{5000}$	.0046	.46%
$\frac{71}{1000}$	.071	7.1%
$\frac{7}{8}$	.875	87.5%
$\frac{16}{1}$	16.0	1600%
$\frac{58}{25} = 2\frac{8}{25}$	2.32	232%

9.  $8x^4 - 3x^2 + 10 + x^4 + x^2 - x = 9x^4 - 2x^2 - x + 10$

$$10. (5x^2y - 3xy) - (-2x^2y - 7xy)$$

$$= 5x^2y - 3xy + 2x^2y + 7xy = 7x^2y + 4xy$$

$$11. (2x^2 - 3y)3x - 2x(x^2 + 3y)$$

$$= 6x^3 - 9xy - 2x^3 - 6xy$$

$$= 4x^3 - 15xy$$

$$12. \begin{array}{r} x^2 - 2x + 1 \\ 2x - 6 \overline{) 2x^3 - 10x^2 + 14x - 6} \\ \underline{2x^3 - 6x^2} \phantom{+ 14x - 6} \\ -4x^2 + 14x \phantom{- 6} \\ \underline{-4x^2 + 12x} \phantom{- 6} \\ + 2x - 6 \\ \underline{2x - 6} \\ \phantom{+ 2x - 6} \phantom{- 6} \\ \phantom{+ 2x - 6} \phantom{- 6} \phantom{- 6} \end{array}$$

NO REMAINDER

$$13. \begin{array}{l} 2(a - 3) = 4 + (a - 14) \\ 2a - 6 = 4 + a - 14 \\ 2a - a = 4 - 14 + 6 = -4 \\ a = -4 \end{array}$$

$$4. \begin{array}{l} 7(b - 1) + 3(b - 4) = 2(b + 1) - 4(2b + 3) \\ 7b - 7 + 3b - 12 = 2b + 2 - 8b - 12 \\ 10b - 19 = -6b - 10 \\ 10b + 6b = -10 + 19 \\ 16b = 9 \\ b = \frac{9}{16} \end{array}$$

$$15. \frac{9x}{4} - \frac{13}{6} = \frac{11x}{8} \quad \text{Multiply by 24.}$$

$$54x - 52 = 33x$$

$$21x = 52$$

$$x = \frac{52}{21}$$

$$16. (a^2 + b^2) - (a + b)^2 = a^2 + b^2 - (a^2 + 2ab + b^2)$$

$$= a^2 + b^2 - a^2 - 2ab - b^2 = -2ab$$

$$17. 6x - 7y = -20 \rightarrow 6x - 7y = -20$$

$$2x - 3y = -8 \rightarrow \underline{6x - 9y = -24}$$

$$2y = 4$$

$$| y = 2 |$$

If  $y = 2$  then  $6x - 7(2) = -20$

$$6x - 14 = -20$$

$$6x = -20 + 14 = -6$$

$$| x = -1 |$$

$$18. \frac{3}{4}x - \frac{2}{3}y = 5 \rightarrow 9x - 8y = 60$$

$$\frac{1}{2}x + \frac{1}{3}y = 1 \rightarrow 3x + 2y = 6$$

Multiply second equation by 4.

$$9x - 8y = 60$$

$$12x + 8y = 24$$

Add the equations.

$$21x = 84$$

$$| x = 4 |$$

$$18. (\text{con't}) \text{ If } x = 4 \text{ then } 9(4) - 8y = 60$$

$$-8y = 60 - 36$$

$$-8y = 24$$

$$| y = -3 |$$

19.  $x = \text{second number}$   
 $x - 3 = \text{first number}$   
 $(x - 3) + 7 = x + 4 = \text{third number}$

$$\begin{aligned}
 x + (x - 3) + (x + 4) &= 28 \\
 3x + 1 &= 28 \\
 3x &= 27 \\
 x &= 9 = \text{second number} \\
 x - 3 &= 6 = \text{first number} \\
 x + 4 &= 13 = \text{third number}
 \end{aligned}$$

20.  $x = \text{speed first train, } 2x = \text{distance first train}$   
 $x + 18 = \text{speed second train, } 2(x + 18) = \text{distance second train}$

$$\begin{aligned}
 2x + 2(x + 18) &= 168 \\
 4x + 36 &= 168 \\
 4x &= 168 - 36 \\
 4x &= 132 \\
 x &= 33 \text{ m.p.h.} \\
 x + 18 &= 51 \text{ m.p.h.}
 \end{aligned}$$