

Conceptual Questions Some of these items will be on the actual test

1. What is the first step when adding or subtracting mixed numbers or fractions?

Find a common denominator

2. What is the first step when multiplying or dividing mixed numbers?

Create Improper Fractions

3. Match each number system with the appropriate number set.

- | | |
|---|--|
| _____ Natural / Counting Numbers - C | A. $\{-3\frac{1}{5}, -\frac{2}{1}, 0, 1\frac{2}{3}, \sqrt{25}\}$ |
| _____ Whole Numbers - E | B. $-\sqrt{11}, -\frac{\sqrt{9}}{2}, \sqrt{3}, \pi, \sqrt{22}$ |
| _____ Integer Numbers - F | C. $\{1, 2, 3, \dots\}$ |
| _____ Rational Numbers - A | D. $\{-2\frac{1}{5}, -\frac{\sqrt{7}}{2}, 0, 1\frac{2}{3}, \sqrt{36}, \sqrt{41}\}$ |
| _____ Irrational Numbers - B | E. $\{0, 1, 2, 3, \dots\}$ |
| _____ Real Numbers - D | F. $\{\dots -3, -2, -1, 0, 1, 2, 3, \dots\}$ |

4. Illustrate the borrowing idea with this problem.

$$\begin{array}{r}
 11\frac{1}{4} - 3\frac{2}{5} \\
 11 - 3 \quad | \quad 1/4 - 2/5 \\
 8 \quad \quad | \quad 5/20 - 8/20 \\
 8 \quad \quad | \quad -3/20 \\
 7 \ 20/20 \quad | \quad -3/20 \\
 7 \quad \quad | \quad 17/20
 \end{array}$$

- : Work whole with whole and part with part
- : signs do not match so borrow
- : equivalent statement $8 = 7 \ 20/20$
- : then work part with part so signs on mixed number match

Knowing the Squares (Should take less than a minute to do entire section)

1. $14^2 = 196$ 1. _____
2. $15^2 = 225$ 2. _____
3. $16^2 = 256$ 3. _____
4. $19^2 = 361$ 4. _____
5. $21^2 = 441$ 5. _____
6. $23^2 = 529$ 6. _____
7. $24^2 = 576$ 7. _____
8. $25^2 = 625$ 8. _____

Add and Subtracting Integers

1. $15 - (-3) + 2$ 1. _____
 $18 + 2$
 20
2. $-22 + (-9) + 3$ 2. _____
 $-31 + 3$
 -28
3. $6 - (-17) + 3$ 3. _____
 $23 + 3$
 26

Multiplying and Dividing Integers

4. $(-12)(5) \div (-6)$ 4. _____
 $-60 \div -6$
 10
5. $(-100) \div (-10)(-6) \div 12$ 5. _____
 $10(-6) \div 12$
 $-60 \div 12$
 -5
6. $-5 \cdot -3 \cdot 0 \cdot 7$ 6. _____
 $15(0)(7)$
 $0(7)$
 0

Add and Subtracting Rationals

7. $-8\frac{3}{8} + 4\frac{1}{2} - 5\frac{3}{4}$

$$\begin{array}{r|l} -8 + 4 - 5 & -3/8 + 1/2 - 3/4 \\ -9 & -3/8 + 4/8 - 6/8 \\ -9 & -5/8 \\ \hline -9 & 5/8 \end{array}$$

7. _____

: Work whole with whole and part with part

: signs do not match so borrow

: signs match so no need to borrow

: just reduce fraction

8. $-4\frac{2}{5} - \left(-4\frac{1}{2}\right) - 2\frac{3}{5}$

$$\begin{array}{r|l} -4 + 4 - 2 & -2/5 + 1/2 - 3/5 \\ -2 & -4/10 + 5/10 - 6/10 \\ -2 & -5/10 \\ \hline -2 & 1/2 \end{array}$$

8. _____

: Work whole with whole and part with part

: signs do not match so borrow

: signs match so no need to borrow

: just reduce fraction

Multiplying and Dividing Rationals

9. $\left(-3\frac{1}{5}\right) \cdot 1\frac{1}{5} \div \left(-\frac{2}{5}\right)$

$$\begin{array}{l} -16/5 \cdot 6/5 \div 2/5 \\ -16/3 \cdot 6/5 \cdot 5/2 \\ -16/1 \cdot 3/5 \cdot 1/1 \\ 48/5 \\ 9 \ 3/5 \end{array}$$

9. _____

: get improper fractions

: reciprocate any divisors

: reduce any numerator with any denominator

: just reduce fraction

10. $\left(-4\frac{2}{3}\right) \div \left(-3\frac{1}{2}\right) \cdot 1\frac{1}{5}$

$$\begin{array}{l} -14/3 \div -7/2 \cdot 6/5 \\ -14/3 \cdot -2/7 \cdot 6/5 \\ -2/1 \cdot 2/1 \cdot -2/5 \\ 8/5 \\ 1 \ 3/5 \end{array}$$

10. _____

: get improper fractions

: reciprocate any divisors

: reduce any numerator with any denominator

: just reduce fraction

11. $\frac{8}{15} \div \left(-\frac{2}{5}\right) \div \left(-\frac{1}{2}\right)$

$$\begin{array}{l} 8/15 \cdot -5/2 \cdot -2/1 \\ 8/3 \cdot -1/1 \cdot -1/1 \\ 8/3 \\ 2 \ 2/3 \end{array}$$

11. _____

: reciprocate any divisors

: reduce any numerator with any denominator

: just reduce fraction

Order of Operations

$$\begin{aligned} & 2[(16 \div 8) - (-2)] + 4 \\ & 2[(2) - (-2)] + 4 \\ 12. & 2[(2) + (+2)] + 4 \\ & 2[4] + 4 \\ & 8 + 4 \\ & 12 \end{aligned}$$

$$\begin{aligned} & \frac{2}{3}[8(2-5)^2 + 3 \cdot 2] \\ & \frac{2}{3}[8(-3)^2 + 3 \cdot 2] \\ 13. & \frac{2}{3}[8(9) + 3 \cdot 2] \\ & \frac{2}{3}[72 + 6] \\ & \frac{2}{3}[78] \\ & 52 \end{aligned}$$

Order of Operations (Show all work since answers given)

$$\begin{aligned} & 12 \left[10 - \frac{(5^2 - 6) \cdot 3}{6} \right] = 6 \\ & 12 \left[10 - \frac{(25 - 6) \cdot 3}{6} \right] \\ & 12 \left[10 - \frac{(19) \cdot 3}{6} \right] \\ 14. & 12 \left[10 - \frac{(19) \cdot 1}{2} \right] \\ & 12 \left[10 - 9 \frac{1}{2} \right] \\ & 12 \left[\frac{1}{2} \right] \\ & 6 \end{aligned}$$

$$\begin{aligned} & 5 \left[\frac{1}{2} + \left(\frac{3}{5} \cdot \frac{5}{6} \right) \div \frac{5}{8} \right] = 6 \frac{1}{2} \\ & 5 \left[\frac{1}{2} + \left(\frac{1}{1} \cdot \frac{1}{2} \right) \cdot \frac{8}{5} \right] \\ & 5 \left[\frac{1}{2} + \left(\frac{1}{2} \right) \cdot \frac{8}{5} \right] \\ 15. & 5 \left[\frac{1}{2} + \left(\frac{1}{1} \right) \cdot \frac{4}{5} \right] \\ & 5 \left[\frac{5}{10} + \frac{8}{10} \right] \\ & \frac{5}{1} \left[\frac{13}{10} \right] \\ & \frac{13}{2} \\ & 6 \frac{1}{2} \end{aligned}$$

(Show all work since answers given)

$$9 \left[\left(\frac{5}{8} - \frac{1}{4} \right) \cdot \frac{1}{9} \div \frac{3}{4} \right] = \frac{1}{2}$$

$$9 \left[\left(\frac{5}{8} - \frac{2}{8} \right) \cdot \frac{1}{9} \cdot \frac{4}{3} \right]$$

$$9 \left[\left(\frac{3}{8} \right) \cdot \frac{1}{9} \cdot \frac{4}{3} \right]$$

16. $9 \left[\left(\frac{1}{2} \right) \cdot \frac{1}{9} \cdot \frac{1}{1} \right]$

$$9 \left[\frac{1}{18} \right]$$

$$\frac{9}{1} \left[\frac{1}{18} \right]$$

$$\frac{1}{2}$$

$$\left[\frac{1}{6} \div \frac{5}{9} - \left(\frac{1}{5} \right)^2 \right] - \frac{7}{10} = -\frac{11}{25}$$

$$\left[\frac{1}{6} \cdot \frac{9}{5} - \left(\frac{1}{25} \right) \right] - \frac{7}{10}$$

$$\left[\frac{1}{2} \cdot \frac{3}{5} - \left(\frac{1}{25} \right) \right] - \frac{7}{10}$$

17. $\left[\frac{3}{10} - \left(\frac{1}{25} \right) \right] - \frac{7}{10}$

$$\left[\frac{15}{50} - \left(\frac{2}{50} \right) \right] - \frac{7}{10}$$

$$\left[\frac{13}{50} \right] - \frac{35}{50}$$

$$\frac{-22}{50}$$

$$\frac{-11}{25}$$

Exploring Patterns

- A. 11, 13, 16, 20, 25, 31, 38, 46, 55, 65
 $+ 2 + 3 + 4 + 5 + 6 \dots$
- B. 100, 121, 144, 169, 196, 225, 256, 289
 $+ 10^2 + 11^2 + 13^2 + 14^2 + 15^2 \dots$
- C. 10, 8, 16, 18, 9, 6, 18, 21, 7, 3, 12, 16, 4
 $-2, \times 2, +2, \div 2, -3, \times 3, +3, \div 3, -4, \times 4, +4, \div 4$
- D. 33, 39, 40, 47, 48, 56, 57, 66, 67, 77
 $+ 6 + 1 + 7 + 1 + 8 \dots$