

## Module 1.B : Number systems, Order of operations, and Applications

### SECTION 1 : Perform a calculation using order of operations.

Does it matter what order you perform the following calculation,  $5(4)-1$ ?

Order of Operations: Obey the following order when simplifying expressions:

1. If an expression has parentheses, simplify within the parentheses first. If there are nested parentheses, i.e.  $[( )]$ , start the simplification within the innermost parentheses and work outward.
2. Evaluate exponents, radicals and absolute values next.
3. Multiply and divide.
4. Add and subtract.

#### EXERCISE 3

Simplify

a)  $4-3^2$

b)  $-4+3\cdot 2-15/5+\frac{16}{2+6}$

c)  $-2-3[1+2(3-1)^2]$

d)  $\frac{-2}{5}+\frac{5}{2}\cdot 7$

#### SOLUTION

a)  $4-3^2=4-9=-5$

b)

$$-4+3\cdot 2-15/5+\frac{16}{2+6} =$$

$$-4+3\cdot 2-15/5+\frac{16}{8} =$$

$$-4+6-3+2=1$$

c)

$$-2-3[1+2(3-1)^2]$$

$$= -2-3[1+2(2)^2]$$

$$= -2-3[1+2\cdot 4]$$

$$= -2-3[1+8]$$

$$= -2-3[9]$$

$$= -2-27 = -29$$

d)

$$\frac{-2}{5}+\frac{5}{2}\cdot 7 = \frac{-2}{5}+\frac{5}{2}\cdot \frac{7}{1}$$

$$= \frac{-2}{5}+\frac{35}{2}$$

$$= \frac{-2}{5}\cdot \frac{2}{2}+\frac{35}{2}\cdot \frac{5}{5}$$

$$= \frac{-4}{10}+\frac{175}{10}$$

$$= \frac{171}{10}$$

## SECTION 2 - Perform basic operations on fractions.

For two fractions,  $\frac{a}{b}$  and  $\frac{c}{d}$ : (remember we cannot divide by zero so  $b \neq 0$  and  $d \neq 0$ )

- $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$ , where  $b \neq 0, d \neq 0$  and  $\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$ , where  $b \neq 0, c \neq 0, d \neq 0$ .
- $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$  where  $b \neq 0$ , and  $\frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$ , where  $b \neq 0$ .

### EXERCISE 4

Simplify:  $\frac{3}{4} + \frac{5}{3} \cdot \frac{1}{2}$

### SOLUTION

$$\begin{aligned}\frac{3}{4} + \frac{5}{3} \cdot \frac{1}{2} &= \frac{3}{4} + \frac{5 \cdot 1}{3 \cdot 2} \\ &= \frac{3}{4} \cdot \frac{1}{1} + \frac{5 \cdot 1}{3 \cdot 2} \\ &= \frac{3}{4} \cdot \frac{1}{2} + \frac{5}{3} \cdot \frac{1}{2} \\ &= \frac{3}{8} + \frac{5}{6} \\ &= \frac{3}{8} \cdot \frac{3}{3} + \frac{5}{6} \cdot \frac{4}{4} \\ &= \frac{9}{24} + \frac{20}{24} = \frac{29}{24}\end{aligned}$$

MODULE 1.B - ASSESSMENT

\_\_\_\_\_4. Simplify  $3-5^2$

- A** 4      **B** -4      **C** -22      **D** 28      **E** I do not know

\_\_\_\_\_5. Simplify  $2-4^2-3+6^2$

- A** 13      **B** -4      **C** -5      **D** 19      **E** I do not know

\_\_\_\_\_6. Simplify  $-1+2\cdot 5-42/7+\frac{32}{-2+4}$

- A** 15      **B** 17.5      **C** 19      **D** 20.71      **E** I do not know

=====7. Simplify  $-5-\frac{1}{2}\left[1+3(3-6)^2\right]$

- A** -33      **B** -18      **C** 9      **D** -19      **E** I do not know

=====8. Simplify  $\frac{-3}{4}+\frac{1}{2}\cdot 5$

- A**  $\frac{7}{4}$       **B**  $\frac{-1}{4}$       **C**  $\frac{1}{2}$       **D**  $\frac{8}{10}$       **E** I do not know