Note: no calculators on the Unit 1 Test (unless you have an accommodation)

1.2 Exponents and Order of Operations

EXAMPLE 1 Evaluating Exponential Expressions

Find the value of each exponential expression.

(a) $5^2 = 5 \cdot 5 = 25$ (b) $6^3 = 6 \cdot 6 \cdot 6 = 216$ (c) $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$ (d) $\left(\frac{2}{3}\right)^3 = \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3} = \frac{8}{27}$

(e) $(0.3)^2 = (.3)(.3) = .09$

$0.3 \times 0.3 = .09$

Order of Operations:

- **P** Parentheses ( )
- **E** Exponents
- **MD** Multiply or Divide (either can be 1st – go left → right!)
- **AS** Add or Subtract (either can be 1st – go left → right!)

EXAMPLE 2 Using the Rules for Order of Operations

Find the value of each expression.

a) $4 + 5 \cdot 6$
$= 4 + 30$
$= 34$
(MD, then AS)

b) $9(7 + 6)$
$= 9(13)$
$= 117$
$13 \times 9 = 117$
(P, then MD, then AS)

c) $6 \cdot 8 + 24 \div 2$
$= 48 + 12$
$= 60$
$48 + 12 = 60$
$24 \div 2 = 12$ OR $2\overline{)24}$, $-2\downarrow$, 04, -4, 0
(P, E, MD, AS)

d) $2(5 + 6) + 7 \cdot 3$
$= 2(11) + 7 \cdot 3$
$= 22 + 21$
$= 43$
(P, E, MD, AS)

e) $6 + \frac{3}{4} \div \frac{1}{4} 5$
$= 6 + \frac{3}{4} \cdot \frac{4}{1}$
$= 6 + 3$
$= 9$
(P, E, MD, AS)

f) $6 \cdot 12 \div 3 + 4 \cdot 2^3 - 3^3$
$= 6 \cdot 12 \div 3 + 4 \cdot 8 - 27$
$= 72 \div 3 + 32 - 27$
$= 24 + 32 - 27 = 29$
$3\overline{)72}$, $-6\downarrow$, 12, -12, 0
(E, MD, AS)

★ ★ careful! ★ ★ ★ ★

Now you try!

g) $18.3 - 2(6.4)$
$= 18.3 - 12.8$
$= 5.5$
$6.4 \times 2 = 12.8$
$18.3 - 12.8 = 5.5$

h) $6(2 + 4) - 7 \cdot 5$
$= 6(6) - 7 \cdot 5$
$= 36 - 35$
$= 1$

i) $80 \div 10 \cdot 2 - 2^3 + 3 \cdot 4^2$
$= 8 \cdot 2 - 8 + 3 \cdot 16$
$= 16 - 8 + 48$
$= 56$
$16 \times 3 = 48$

[ ] → like ( )

→ simplify everything in numerator, everything in denom, then put it together

EXAMPLE 3 Using Brackets and Fraction Bars as Grouping Symbols

Simplify each expression.

a) $2[8+3(6+5)]$

$2[8+3\cdot 11]$ Inside ( ) or [ ] follow P E MD AS

$2[8+33]$

$2[41] = 2\cdot 41 = \boxed{82}$

$33 + 8 = 41$

b) $\frac{4(5+3)+3}{2(3)-1} = \frac{4(8)+3}{6-1} = \frac{32+3}{5} = \frac{35}{5} = \boxed{7}$

Now you try!

c) $7[(3^2-1)+4]$ P E MD AS

$7[(9-1)+4]$

$7[8+4]$

$7[12] = 7\cdot 12 = \boxed{84}$

d) $\frac{9(14-4)-2}{4+3\cdot 6} = \frac{9(10)-2}{4+18} = \frac{90-2}{22} = \frac{88}{22} = \boxed{4}$

$22\overline{)88}$ 4, -88, 0

1.3 Variables, Expressions, and Equations

Objectives:

- Evaluate algebraic expressions, given values for the variables
- Translate word phrases to algebraic expressions
- Identify solutions of equations
- Identify solutions of equations from a set of numbers
- Distinguish between expressions and equations

Variable	Algebraic expression

EXAMPLE 1 Evaluating Expressions

Find the value of each algebraic expression for $x = 5$.

a) $8x$ **b)** $3x^2 - 4$