Strand 1 – Number Sense and Algebra

1-1 Exponent laws

1-2 Polynomials

1-3 Distributive Property

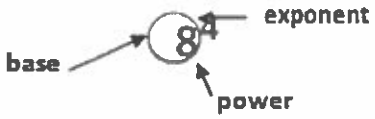
1-4 Solving Equations

EQAO Practice Questions

1-1 Exponent laws:

Key Concepts

Terminology:



Multiplication Law: where multiplying powers with the SAME BASE you ADD the EXPONENTS. $(a^n)(a^m)=a^{n+m}$

Division Law: where dividing powers with the SAME BASE you SUBTRACT the EXPONENTS. $\frac{a^n}{a^m}=a^{n-m}$

Power Law: where there is a power of a power you MULTIPLY the EXPONENTS $(a^n)^m=a^{nm}$

a) $p\times p^4$

b) $2a^2\times 4a^3\times a^4$

c) $(-9x^2)(6x^3)$

d) $(3x^2y)(4xy^2)(-2x^3y)$

e) $\frac{x^9}{x^2}$

f) $\frac{x^5y^8}{xy^2}$

g) $\frac{-24x^6y^{12}z^{10}}{-3x^2y^6z^2}$

h) $\left(a^2\right)^{12}$

i) $\left(a^3b^2\right)^4$

j) $\left(-2y^3\right)^3$

k) $\frac{\left(x^2\right)^3}{\left(x^3x\right)}$

l) $\left[\frac{\left(-3a^2b\right)^3(2b)^2}{18a^3b^4}\right]^3$

m) $\left[\frac{3\left(x^2y\right)^5}{\left(-2xy^2\left(x^3\right)^2\right)}\right]^2$

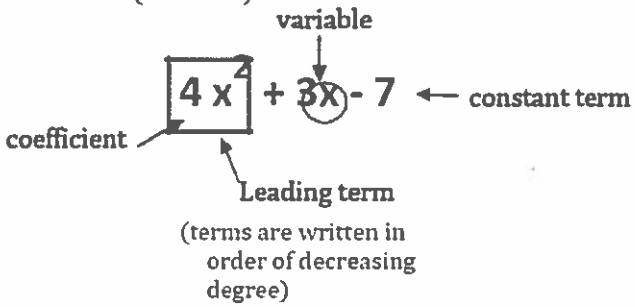
n)

1-2 Polynomials:

Key Concepts

Polynomial: terms that are separated by addition and/or subtraction

- Can be classified according to their number of terms: monomial (1 term), binomial (2 terms), trinomial (3 terms).



Term: has a coefficient and/or a variable (exponent on variable must be a natural number)

Coefficient: the number and the sign that is in front of the variable

Degree: the value of the exponent on the variable

A constant: a term that does not have a variable

Like terms: terms that have the same variable with the same exponent, only like terms can be added or subtracted

1. Complete the table below:

Expression	Number of terms	Coefficient on x	Constant	Degree
$3x$				
$7x-9y$				
$4x^2-3x+7$				
$-5x+13$				
$2x^3-6x^2+9x+1$				

2. Circle the like terms

a)	$-6k,-10,7k$	b)	$x^4y^2,5x^2y^4,(3x^2y)^2$
c)	$-r,8r^2,10r^3,-10r$	d)	$0.7mn^3,2mn^2,\frac{1}{2}mn,-17mn^3$

3. Simplify the expression

a)	$-6k+7k$	d)	$5a^2+3a^2x-7a^3+2a^2-8a^2x+4$
b)	$n-10+9n-3$	e)	$(6x^2+4x+1)-(4x+20)$
c)	$12r+5+3r-5$	f)	$(8x^3-6x+10)-(x^3+10x-9)$

1-3 Distributive Property

Key Concepts

Distributive Property: distribute the term or constant to each term or constant inside the parentheses.

$$a(b+c)=ab+ac$$

1. Expand and simplify where necessary.

a)	$-6(a+8)$	e)	$4(5x-1)-5(3x+2)$
b)	$3a(4x+2y)$	f)	$-4(4+3n)-8(n+7)$
c)	$x^2y^2(2x+3y)$	g)	$\frac{3}{2}\left(\frac{1}{3}a-\frac{2}{3}b\right)-\frac{3}{4}\left(\frac{1}{3}a+\frac{2}{3}b\right)+8$
d)	$(5x^2+3x+7)(9xy)$		

1-4 Solving Equations

Key Concepts

Equation: contains two expressions which are equivalent. For example: 2x+3=7

Expression: a representation of a quantity. For example: 7x+1

Solving Equations: solve multi-step equations by applying inverse order of operations

****KEEP IT SIMPLE:** Eliminate fractions as early as possible by **MULTIPLYING** by the **DENOMINATOR**

1. Solve for the unknown variable.

a)	$5x+1=31$	b)	$6x+4=20-2x$
c)	$5(x+2)=25$	d)	$4(5x+2)=7(2x+3)$
e)	$-\frac{5}{6}x=\frac{3}{4}$	f)	$m+\frac{2}{3}=\frac{1}{4}m-1$
g)	$\frac{2}{3}(3x+1)=5$	h)	$\frac{1}{2}+\frac{2}{5}t-1=\frac{1}{5}t+t$

Answers

1-1 Exponent Laws

a)	p^5	b)	$8a^9$	c)	$-54x^5$	d)	$-24x^6y^4$	e)	x^7
f)	x^4y^6	g)	$8x^4y^6z^8$	h)	a^{24}	i)	$a^{12}b^8$	j)	$-8y^9$
k)	x^2	l)	$-216a^9b^3$	m)	$\frac{9x^6y^6}{4}$				

1-2 Polynomials

1.

Expression	Number of terms	Coefficient on x	Constant	Degree
$3x$	1	3	0	1
$7x-9y$	2	7	0	1
$4x^2-3x+7$	3	-3	7	2
$-5x+13$	2	-5	13	1
$2x^3-6x^2+9x+1$	4	9	1	3

2.

a) -6k, 7k	c) -r, -10r
b) $x^4y^2,(3x^2y)^2$	d) $0.7mn^3,-17mn^3$

3.

a) k	b) $10n-13$	c) $15r$	d) $-7a^3+7a^2-5a^2x+4$
e) $6x^2-19$	f) $7x^3-16x+19$		

1-3 Distributive Property

a) $-6a-48$	b) $12ax+6ay$	c) $2x^3y^2+3x^2y^3$
d) $45x^3y+27x^2y+63xy$	e) $5x-14$	f) $-20n-72$
g) $\frac{1}{4}a-\frac{3}{2}b+8$		

1-4 Solving Equations

a) $x=6$	b) $x=2$	c) $x=3$	d) $x=\frac{13}{6}$
e) $x=\frac{-9}{10}$	f) $x=\frac{-20}{9}$	g) $x=\frac{13}{6}$	h) $x=\frac{-5}{8}$

EQAO Practice Questions

1. The equation below can be used to convert between temperatures in degrees Celsius, C, and temperatures in degrees Fahrenheit, F.

$$\frac{C}{5} = \frac{F - 32}{9}$$

Which correctly completes the statement?

If the temperature in degrees Celsius is 15, the temperature in degrees Fahrenheit is

a less than 0.

b greater than 60.

c between 20 and 40.

d between 40 and 60.

2. A ball is dropped from a height of 25 m. The ball's height, H, in metres, after n bounces is represented by the equation below.

$$H = 25\left(\frac{1}{2}\right)^n$$

What is the height of the ball after 4 bounces?

a $\frac{25}{16}$ m

b $\frac{25}{8}$ m

c $\frac{25}{4}$ m

d $\frac{25}{2}$ m

3. What goes in the $\square$ to complete the equation below?

$$(8x^3)(\square) = 24x^{12}$$

a $3x^9$

b $3x^4$

c $16x^9$

d $16x^4$

4. What is the value of $5x^3y^2$ when $x = 2$ and $y = 4$?

a 240

b 320

c 480

d 640

5. Which of the following is a simplified form of

$$(-2m + 3) - (5m - 6)?$$

a $3m - 3$

b $3m + 9$

c $-7m - 3$

d $-7m + 9$

6. Which is a simplified form of this expression?

$$\frac{x^8(x^6)}{x^4}$$

a x^8

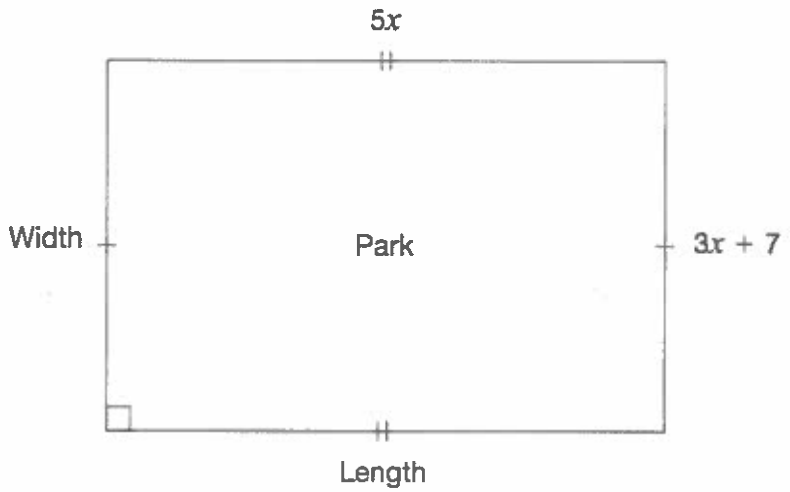
b x^{10}

c x^{12}

d x^{18}

Walking Around the Park

A park in the shape of a rectangle is pictured with algebraic expressions representing its length and width, in metres.



The perimeter of the park, P, can be determined using the equation

$$P = 2l + 2w.$$

Determine an equation to represent the perimeter of the park using the given sides.

$P =$ _____

The perimeter of the park is 350 m.

Determine the length of the park. Show your work.

The length of the park is _____ m.

Share the Profits

Three partners, Luc, Deborah and Melanie, share the profits of a business in the ratio 2:3:7 respectively.

The profit for this year is $176 496.

Determine the share of the profit for each partner.

Show your work.

EQAO Answers

Multiple Choice

1d	**2a**	**3a**
4d	**5d**	**6b**

Open Response

Walking around the park

$P = 2(3x + 7) + 2(5x)$

$350 = 2(3x + 7) + 2(5x)$

$350 = 6x + 14 + 10x$

$350 = 16x + 14$

$336 = 16x$

$21 = x$

5(21)=105 , Therefore the Park is 105 m long

Share the Profits

Total number of parts = 2+3+7=12

Luc earns $\frac{2}{12}(176496) = \$29416$ Deb earns: $\frac{3}{12}(176496) = \$44124$ Mel earns:

$\frac{7}{12}(176496) = \$102956$