CHAPTER 4
Basic algebra

Addition and subtraction of like terms

QUESTION 1   Add the following expressions.

a $3x + 8x =$ _____

b $5x + 11x =$ _____

c $9x + 7x =$ _____

d $18x + 9x =$ _____

e $16x + 25x =$ _____

f $30x + 14x + x =$ _____

g $6xy + 8xy =$ _____

h $9mn + 11nm =$ _____

i $15a + 16a + 7a =$ _____

j $8x + 3x + 7x =$ _____

k $15a^2 + 26a^2 + a^2 =$ _____

l $7p + 6p + 5p + p =$ _____

QUESTION 2   Subtract the following expressions.

a $6a - 2a =$ _____

b $15a - 7a =$ _____

c $8a - 3a =$ _____

d $17x - 2x =$ _____

e $14m - 6m - m =$ _____

f $8y - 3y - y =$ _____

g $15x - 7x - 2x =$ _____

h $6xy - 3xy - xy =$ _____

i $25x^2 + 7x^2 - 4x^2 - 6x^2 =$ _____

j $14y - 3y - y - 2y =$ _____

k $8x - 2x - x =$ _____

l $19p - 3p - 5p =$ _____

QUESTION 3   Simplify the following expressions by adding or subtracting.

a $8a + 7a - 3a =$ _____

b $5x + 6x - x - 2x =$ _____

c $5a + 15a - 6a =$ _____

d $8a + 5a + 3a - 2a =$ _____

e $19xy + 2xy - xy =$ _____

f $7mn + 3nm - 2mn =$ _____

g $9x^2 + 8x^2 - 3x^2 - 5x^2 =$ _____

h $9a^2 + 7a^2 - a^2 - 2a^2 =$ _____

i $5x - 2x + 3x - x =$ _____

j $8t + 6t + 3t - t =$ _____

k $6m + 7m - 2m - m =$ _____

l $8a + 16a - 5a - 7a =$ _____

QUESTION 4   Simplify the following.

a $9x + 3y - 6x + 2y =$ _____

b $20a + 3b + 8b - 11a =$ _____

c $6m + 3n - n - m =$ _____

d $6x^2 - 4x^2 - x^2 + 3x^2 =$ _____

e $8a + 3b + 2b - 6a =$ _____

f $10a + 4a - 5b - b =$ _____

g $7y + 8y - 3x - 4x =$ _____

h $6xy + 3yx - xy - 2yx =$ _____

QUESTION 5   Simplify the following expressions.

a $15 - 8x + 7 - 2x =$ _____

b $8m + 3n - 5m =$ _____

c $18x - 3y + y + x =$ _____

d $2x^2 + 9x^2 - 7y^2 =$ _____

e $10m + 3n - 2m - n =$ _____

f $19xy + 6yz - 13yx =$ _____

g $12a + 6b - 3a =$ _____

h $6a + 9b - 3b - 3a =$ _____

i $9t + 18 - 3t - 15 =$ _____

j $6ab + 3ba + 9ab =$ _____

Basic algebra

Multiplication of pronumerals

QUESTION **1**   Multiply the following expressions.

a $2 \times 5a =$ _____

b $3 \times 6b =$ _____

c $8 \times 9y =$ _____

d $7 \times 3y =$ _____

e $(-6) \times ab =$ _____

f $(-3) \times (-2a) =$ _____

g $3a \times (-b) =$ _____

h $(-2a) \times (-3b) =$ _____

i $(-6x) \times (-3) =$ _____

j $(9ab) \times (-5a) =$ _____

k $(-2a) \times (-8a) =$ _____

l $(-6x) \times (-2x) =$ _____

QUESTION **2**   Find the products of the following.

a $6a \times 3b =$ _____

b $(-6x) \times (-x) =$ _____

c $5x \times 8y =$ _____

d $(-8y) \times (-y) \times 3 =$ _____

e $9a \times 3b =$ _____

f $6a \times (-a) \times 5 =$ _____

g $6y \times 8y =$ _____

h $t \times (-3t) \times (-2) =$ _____

i $9x \times 3y \times 2x =$ _____

j $5a \times (-6ab) =$ _____

QUESTION **3**   Work out the following products.

a $2a \times ab =$ _____

b $3 \times 6a \times 5 =$ _____

c $5a \times 6bc \times a =$ _____

d $ab \times bc \times ca =$ _____

e $9ab \times (-6bc) =$ _____

f $6a \times 7ap =$ _____

g $(-8x) \times 5 =$ _____

h $3x \times 2y \times y =$ _____

QUESTION **4**   Find the following products.

a $8a \times 5b =$ _____

b $(-7k) \times (-2k) =$ _____

c $9x \times (-8y) \times xy =$ _____

d $8ax \times a \times ax =$ _____

e $(-6m) \times (-6m) =$ _____

f $-6t \times 4m \times (-m) =$ _____

g $y \times -y \times -3y =$ _____

h $(-5x) \times (-2) \times (-3x) =$ _____

QUESTION **5**   Simplify the following expressions.

a $8ab \times (-ab) =$ _____

b $7 \times 3a \times (-4a) =$ _____

c $9x \times y \times (-2x) =$ _____

d $2a \times 3b \times 5c =$ _____

e $(-a) \times (-2a) \times (-2b) =$ _____

f $(-x) \times (-y) \times (-x) =$ _____

g $(-5p) \times (-5p) =$ _____

h $6a \times (-3a) \times 2 =$ _____

Basic algebra

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Division of pronumerals

QUESTION **1**   Work out the following divisions.

a $\dfrac{18a}{6} = $ _____

b $\dfrac{9pq}{3} = $ _____

c $\dfrac{12m}{15m^2} = $ _____

d $\dfrac{15x}{5} = $ _____

e $\dfrac{21xy}{7x} = $ _____

f $\dfrac{18a^2}{3a} = $ _____

g $\dfrac{12a}{6} = $ _____

h $\dfrac{36x^2}{4x} = $ _____

i $\dfrac{30y}{10y^2} = $ _____

QUESTION **2**   Find the following divisions.

a $15x \div 5x = $ _____

b $-36xy \div -9x = $ _____

c $12mn \div 4m = $ _____

d $64m^2 \div 8m = $ _____

e $5x \div -5 = $ _____

f $(-48ab) \div (-6a) = $ _____

g $8x \div 2x = $ _____

h $72a^2 \div 9a = $ _____

i $32xy \div 8x = $ _____

j $15ab \div (-5a) = $ _____

k $27ab \div 9a = $ _____

l $16x^2y \div 4xy = $ _____

QUESTION **3**   Divide the following algebraic expressions.

a $(-24)x \div 8 = $ _____

b $(-6ab) \div 3a = $ _____

c $38x^2y \div 19x^2 = $ _____

d $(-15x^2) \div (-5x) = $ _____

e $27x^2y^2 \div 9x^2y = $ _____

f $(-16k) \div (-4k) = $ _____

g $(-52x^2) \div (-13) = $ _____

h $(-36y) \div (-3) = $ _____

i $20pq \div -4p = $ _____

j $50mn \div 5m = $ _____

QUESTION **4**   Simplify the following.

a $28x \div -7x = $ _____

b $68xy \div 4xy = $ _____

c $32x^2 \div (-4x) = $ _____

d $(-18x) \div 9x = $ _____

e $(-30x) \div (-15) = $ _____

f $(-48m^3) \div (-8m^2) = $ _____

g $(-25y^2) \div (-5y) = $ _____

h $(-64ab) \div (-8a) = $ _____

QUESTION **5**   Find the answers to the following.

a $24ab \div (-6a) = $ _____

b $(-24x^3y^2) \div (-6x^2y^2) = $ _____

c $15ab \div -15ab = $ _____

d $36xy \div 4x = $ _____

e $mn^2 \div mn \div n = $ _____

f $15a^2b^2 \div 15abc = $ _____

g $3abc \div bc \div ba = $ _____

h $(-16x^2y) \div (-8xy) = $ _____

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Basic algebra

Multiplication and division of pronumerals

QUESTION **1**   Multiply the following.

a $8a \times 2a =$ _____

b $5a \times 4a \times 3c =$ _____

c $5a \times 3a =$ _____

d $24a^2 \times 4a \times 3a =$ _____

e $9x \times (-3x) =$ _____

f $6a \times 3a \times (-2a) =$ _____

g $15xy \times 3x^2 =$ _____

h $5y \times (-3y) \times (-y) =$ _____

i $8a \times 3b \times 4a =$ _____

j $8 \times 9a \times a^2 =$ _____

k $ab \times a^2 \times 3a =$ _____

l $3ab \times 3ab \times ab =$ _____

QUESTION **2**   Divide the following expressions.

a $15a \div 3a =$ _____

b $(-72a) \div (-8a) =$ _____

c $60p \div 10p =$ _____

d $50ab \div 2ab =$ _____

e $8pq \div (-4p) =$ _____

f $35x^2 \div -5x =$ _____

g $16ab \div (-4a) =$ _____

h $28a^2b \div (-7ab) =$ _____

i $20p \div 5 =$ _____

j $64x^2y^2z^2 \div 16x^2yz =$ _____

k $(-10x) \div (-2x) =$ _____

l $81mn \div (-9m) =$ _____

QUESTION **3**   Work out the following divisions.

a $(-27x^2) \div (3x^2) =$ _____

b $15ab \div (-3a^2) =$ _____

c $16xy \div (-16xy) =$ _____

d $35a^2b^2c^2 \div 5abc =$ _____

e $24ab \div 4a \div 2b =$ _____

f $56t^3 \div 8t^2 =$ _____

g $48x^2y^2 \div 4xy \div 3x =$ _____

h $10ab \div -2a =$ _____

i $15xy \div 6xy =$ _____

j $15abc \div -3bc =$ _____

QUESTION **4**   Simplify the following expressions.

a $5a \times -3a =$ _____

b $4a \times 5b \times 2c =$ _____

c $8x \times (-7x) =$ _____

d $-8a \times 3a \times -2a =$ _____

e $15a \times (-2ab) =$ _____

f $10x \times 2y \times (-2x) =$ _____

g $18a^2 \times 2ab^2 =$ _____

h $ab \times a^2b^2 \times -ab =$ _____

i $8x \times y \times y^2 =$ _____

j $-5x \times 3xy =$ _____

QUESTION **5**   Simplify the following.

a $\dfrac{8x \times 9y}{12xy} =$ _____

b $\dfrac{15a \times 8b}{10ab} =$ _____

c $\dfrac{8a \times 5b}{3a \times 4b} =$ _____

d $\dfrac{(6ab)^2 \times ab}{9a^3b} =$ _____

e $\dfrac{(3a)^2 \times (4b)^2}{24ab} =$ _____

f $\dfrac{(-2x) \times (-3) \times (-5x)}{-6x \times -5} =$ _____

Basic algebra

Indices

QUESTION 1   Simplify the following products.

a $a^2 \times a^3 =$ _____

b $6p^2 \times p^3 =$ _____

c $y^3 \times y^8 =$ _____

d $m^3 \times m^4 =$ _____

e $8a^3 \times 4a^5 =$ _____

f $x^7 \times x^5 \times x^3 =$ _____

g $x^5 \times x^7 =$ _____

h $9a^2 \times 8a^7 =$ _____

i $10p^5 \times 8p^6 =$ _____

j $x^8 \times x^{12} =$ _____

k $a^4b^4 \times a^3b^3 =$ _____

l $9x^2 \times 4x^5y^5 =$ _____

QUESTION 2   Simplify these divisions.

a $a^{12} \div a^8 =$ _____

b $36m^6 \div 9m^4 =$ _____

c $20a^8b^7 \div 5a^7b^6 =$ _____

d $a^{15} \div a^7 =$ _____

e $k^{15} \div k^{10} =$ _____

f $12a^6b^9 \div 6a^4b^4 =$ _____

g $a^{48} \div a^{36} =$ _____

h $48a^7 \div 12a^5 =$ _____

i $36x^{12}y^8 \div (-4x^2y^7) =$ _____

j $m^{16} \div m^9 =$ _____

k $m^6n^8 \div m^4n^6 =$ _____

l $64a^8b^9 \div 8a^6b^7 =$ _____

QUESTION 3   Simplify these expressions.

a $\left(a^2\right)^3 =$ _____

b $\left(y^5\right)^4 =$ _____

c $\left(8x^2y^3\right)^2 =$ _____

d $\left(m^5\right)^2 =$ _____

e $\left(x^3\right)^7 =$ _____

f $\left(9ab^2\right)^3 =$ _____

g $\left(x^6\right)^4 =$ _____

h $\left(4a^2\right)^3 =$ _____

i $\left(5m^4\right)^3 =$ _____

j $\left(a^7\right)^6 =$ _____

k $\left(9p^2\right)^2 =$ _____

l $\left(10a^3b^3\right)^3 =$ _____

QUESTION 4   Use index laws to simplify the following.

a $a^0 =$ _____

b $(2x)^0 =$ _____

c $9x^0 =$ _____

d $m^0 =$ _____

e $\left(3x^2\right)^0 =$ _____

f $2a^0 =$ _____

g $x^0 =$ _____

h $(4mn)^0 =$ _____

i $(5a)^0 =$ _____

QUESTION 5   Simplify the following.

a $x^{10} \div x^3 =$ _____

b $p^6q^3 \div p^2q^2 =$ _____

c $a^2 \times \left(a^3\right)^4 =$ _____

d $m^5 \times m^4 =$ _____

e $\left(8p^2\right)^2 =$ _____

f $x^{12} \div \left(x^2\right)^3 =$ _____

g $6x^2 \times 5x^3 =$ _____

h $9m^4 \times m^2n =$ _____

i $\left(3x^2\right)^3 \div 9x^3 =$ _____

QUESTION 6   Use index laws to simplify the following.

a $3\left(a^4\right)^3 \times 4a^0 =$ _____

b $\left(2ab^2\right)^3 \div 4(ab)^2 =$ _____

c $a^{12} \div a^8 \div a^2 =$ _____

d $\left(6a^2\right)^2 \div 4a^3 =$ _____

e $(8a)^2 \div (4b)^2 =$ _____

f $15ab \times 3a \times b =$ _____

g $\left(x^5\right)^2 \div x^7 =$ _____

h $a^3b \times a^2b \times ab =$ _____

i $28x^2y \div 7x =$ _____

Basic algebra

Grouping symbols

QUESTION **1**   Expand the following expressions.

a $3(x+y) =$ _____

b $5(2a+3b) =$ _____

c $4(2a+3) =$ _____

d $6(8a-7b) =$ _____

e $8(m+3p) =$ _____

f $3(5a-4m) =$ _____

g $5x(x+8) =$ _____

h $7(x-5) =$ _____

i $9a(a-2b) =$ _____

j $12(2x-3) =$ _____

k $6m(2a+n) =$ _____

l $15(3x-7) =$ _____

QUESTION **2**   Write these expressions without grouping symbols.

a $-3(x+2) =$ _____

b $-5x(2x+1) =$ _____

c $-2(2x-7) =$ _____

d $-2x(8x-3y) =$ _____

e $-3(4x-5) =$ _____

f $-y(x+y^2) =$ _____

g $-8(8x-9) =$ _____

h $-m(3m+8) =$ _____

i $-2x(x+1) =$ _____

j $-2n(8-5m) =$ _____

k $-3x(2x+5) =$ _____

l $-6t(2t-3) =$ _____

QUESTION **3**   Expand the following expressions.

a $5(2x+7) =$ _____

b $7(3x-11) =$ _____

c $-3(4x-9) =$ _____

d $-4(2x+5) =$ _____

e $8(6y+3) =$ _____

f $-3a(5a+5) =$ _____

g $-x(2x+7) =$ _____

h $-m(8m-5) =$ _____

i $-2t(3t+5) =$ _____

j $8a(2a+3b) =$ _____

k $-8x(3x-5) =$ _____

l $6p(2p-3m) =$ _____

QUESTION **4**   Expand and simplify.

a $2(x+3)+5x =$ _____

b $4(y+3)+7y+5 =$ _____

c $5(xy-7)-3xy =$ _____

d $9(p-7)-8p-7 =$ _____

e $4y(y+3)-2y^2 =$ _____

f $8x-3(x-2) =$ _____

g $9p-3(8-p) =$ _____

h $5m+4(m-4) =$ _____

i $9m(2m+1)-10m^2 =$ _____

j $7(x-5)-3x+9 =$ _____

k $8(t-3)-3t =$ _____

l $6(x+8)-3(x-2) =$ _____

QUESTION **5**   Expand and simplify.

a $4(m+3)+2(m+1) =$ _____

b $5(x+3)-3(x-1) =$ _____

c $8(2x+7)+3(x+2) =$ _____

d $8(2x+7)-4(2x-5) =$ _____

e $5(y+7)-2(y-1) =$ _____

f $9(3x+1)-5(2x-3) =$ _____

g $7(n-4)-2(n+2) =$ _____

h $x(2x+3)-3(x+1) =$ _____

Basic algebra

Substitution

QUESTION **1**   If $m = 7$, $n = 4$ and $p = 12$, evaluate the following.

a $mn = $ _____

b $mnp = $ _____

c $mn \div p = $ _____

d $m^2 n^2 = $ _____

e $mnp^2 = $ _____

f $m^2 + n^2 + p^2 = $ _____

g $m + n + p = $ _____

h $7m - p = $ _____

i $m^2 - 5p = $ _____

j $m^2 + 10 + p = $ _____

k $mn^2 p - mn = $ _____

l $8m^2 - 12 = $ _____

QUESTION **2**   If $a = 4$, find the value of the following expressions.

a $5a + 7 = $ _____

b $(a - 5)^2 = $ _____

c $a^2 - 9 = $ _____

d $85 - 4a = $ _____

e $3a(a + 4) = $ _____

f $5a^2 + 8 = $ _____

g $5(a + 6) = $ _____

h $a^3 = $ _____

i $\sqrt{25 - a^2} = $ _____

j $3(2a + 7) = $ _____

k $3a^2 = $ _____

l $(a + 7)(a - 7) = $ _____

QUESTION **3**   If $x = 7.2$, $y = 3.5$ and $z = 6.4$, evaluate each expression correct to 1 decimal place.

a $x + y = $ _____

b $x + y + z = $ _____

c $2x + 2y + 2z = $ _____

d $x^2 + y^2 - z^2 = $ _____

e $(x + y)^2 = $ _____

f $3xyz = $ _____

g $x^3 + x^2 = $ _____

h $\sqrt{xy} = $ _____

i $(x - z) \div y = $ _____

j $\sqrt{x + y + z} = $ _____

k $(x - z) + 8 = $ _____

l $\dfrac{xy}{z} = $ _____

QUESTION **4**   If $a = 3$, $b = 4$, $c = 5$ and $d = 6$, find the value of each expression.

a $6c^2 - ab = $ _____

b $a^2 + b^2 + c^2 = $ _____

c $abcd = $ _____

d $ab - cd = $ _____

e $b^2 + c^2 - a^2 = $ _____

f $b^2 - 5 = $ _____

g $6ab + 7bc = $ _____

h $a^2 + b^2 - cd = $ _____

i $3abc \div d = $ _____

Basic algebra

Common factors

QUESTION 1   Factorise the following by taking out the highest common factor.

a $7x + 7 = $ _____
b $10a - 2 = $ _____
c $7y + 14 = $ _____

d $8x - 4 = $ _____
e $3a + 15 = $ _____
f $4x - 12y = $ _____

g $3y + 3 = $ _____
h $5m + 30 = $ _____
i $32x - 28 = $ _____

j $5a - 5 = $ _____
k $6a - 2b = $ _____
l $5a + 35 = $ _____

QUESTION 2   Factorise the following.

a $y^2 + 3y = $ _____
b $6y^3 - 3y^2 = $ _____
c $6x^3 - 3x^2 = $ _____

d $2m^2 + 6m = $ _____
e $8a^2 - 4a = $ _____
f $m^2 - 9m = $ _____

g $8a^2 + 24a = $ _____
h $15y^2 - 6y = $ _____
i $16a^2 - 8a = $ _____

j $x^2 + 9x = $ _____
k $9a^3 - 6a^2 = $ _____
l $28x^2 - 7x = $ _____

QUESTION 3   Factorise the following by taking out the highest common factor.

a $-3x - 3 = $ _____
b $-4y^2 + 16 = $ _____
c $-6n - 3 = $ _____

d $-5x - 40 = $ _____
e $-3x + 27 = $ _____
f $-7t - 14 = $ _____

g $-2m^2 - 4 = $ _____
h $-5m^2 + 35 = $ _____
i $-11x^2 - 22 = $ _____

j $-6a^2 + 12 = $ _____
k $-8a^2 - 32 = $ _____
l $-13y + 39 = $ _____

QUESTION 4   Factorise.

a $-6x^2 - 12x = $ _____
b $-16x^2 - 4x = $ _____
c $-6x - 9 = $ _____

d $-8xy - 4y = $ _____
e $-9x^3 + 27x^2 = $ _____
f $-15x^2 - 5xy = $ _____

g $-6mn - 3 = $ _____
h $-5x^2y^2 + 25xy = $ _____
i $-6mn + 15m^2 = $ _____

j $-8xyz + 4xy = $ _____
k $-9x^2 - 15x = $ _____
l $-x - 3yx = $ _____

QUESTION 5   Factorise the following.

a $8a + 16b = $ _____
b $5a - 25 = $ _____
c $8x - 4y = $ _____

d $9a - 9b = $ _____
e $8 - 8t = $ _____
f $m^3 - 4m^2 = $ _____

g $16ab - a^2 = $ _____
h $14m - 7 = $ _____
i $16ab - 8a^2b = $ _____

j $15x^2y^2 - 5xy = $ _____
k $-6m - 36 = $ _____
l $-4m - 12n = $ _____

QUESTION 6   Factorise the following.

a $3a + 3b + 3c = $ _____
b $16pq - 7p = $ _____
c $-x^2 - 7x = $ _____

d $8x + 8y - 16z = $ _____
e $tx - x = $ _____
f $15a + 5b - 10c = $ _____

g $4x - 8y = $ _____
h $y^3 - y^2 = $ _____
i $18x - 9y + 6 = $ _____

j $16x - 32y = $ _____
k $15mn - 3n = $ _____
l $6a^2 + 3a + 9 = $ _____

m $m^2 - 2mn = $ _____
n $8pq - q^2 = $ _____
o $-6x - 6xy - 12 = $ _____

Basic algebra

Addition and subtraction of algebraic fractions

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QUESTION 1   Find the sum of these algebraic fractions.

a $\dfrac{x}{8}+\dfrac{x}{8}=$ _____

b $\dfrac{3x}{5}+\dfrac{2x}{5}=$ _____

c $\dfrac{9x}{15}+\dfrac{8x}{15}=$ _____

d $\dfrac{a}{9}+\dfrac{a}{9}=$ _____

e $\dfrac{x}{7}+\dfrac{x}{7}=$ _____

f $\dfrac{y}{6}+\dfrac{y}{6}=$ _____

g $\dfrac{x}{3}+\dfrac{x}{4}=$ _____

h $\dfrac{a}{9}+\dfrac{2a}{7}=$ _____

i $\dfrac{3a}{7}+\dfrac{a}{2}=$ _____

j $\dfrac{3x}{5}+\dfrac{5x}{7}=$ _____

k $\dfrac{2m}{3}+\dfrac{5m}{9}=$ _____

l $\dfrac{2a}{5}+\dfrac{3a}{7}=$ _____

QUESTION 2   Subtract the following algebraic fractions.

a $\dfrac{2a}{3}-\dfrac{a}{3}=$ _____

b $\dfrac{5x}{7}-\dfrac{3x}{7}=$ _____

c $\dfrac{15y}{11}-\dfrac{5y}{11}=$ _____

d $\dfrac{6m}{13}-\dfrac{2m}{13}=$ _____

e $\dfrac{5p}{24}-\dfrac{p}{8}=$ _____

f $\dfrac{8x}{15}-\dfrac{3x}{15}=$ _____

g $\dfrac{x}{3}-\dfrac{x}{7}=$ _____

h $\dfrac{x}{8}-\dfrac{x}{12}=$ _____

i $\dfrac{y}{12}-\dfrac{y}{18}=$ _____

j $\dfrac{3x}{20}-\dfrac{x}{10}=$ _____

k $\dfrac{2a+1}{7}-\dfrac{a}{14}=$ _____

l $\dfrac{5x+1}{4}-\dfrac{x}{12}=$ _____

QUESTION 3   Simplify the following.

a $\dfrac{3x}{2}+\dfrac{5x}{3}=$ _____

b $\dfrac{x}{4}-\dfrac{x}{5}=$ _____

c $\dfrac{x}{2}+\dfrac{x}{4}=$ _____

d $\dfrac{x}{8}-\dfrac{x}{4}=$ _____

e $\dfrac{x}{2}+\dfrac{5x}{6}=$ _____

f $\dfrac{3x}{4}-\dfrac{x}{12}=$ _____

g $\dfrac{2x}{9}+\dfrac{x}{3}=$ _____

h $\dfrac{7x}{8}-\dfrac{x}{12}=$ _____

i $\dfrac{7x}{10}+\dfrac{x}{25}=$ _____

j $\dfrac{5x}{24}-\dfrac{x}{36}=$ _____

k $\dfrac{5x}{8}-\dfrac{x}{4}+\dfrac{x}{16}=$ _____

l $\dfrac{m}{10}+\dfrac{7m}{5}-\dfrac{2m}{25}=$ _____

QUESTION 4   Find answers to the following.

a $\dfrac{8p}{9}-\dfrac{p}{3}=$ _____

b $\dfrac{8y}{2}+\dfrac{7y}{4}-\dfrac{y}{8}=$ _____

c $\dfrac{8a}{15}+\dfrac{a}{30}=$ _____

d $\dfrac{7x}{10}-\dfrac{x}{5}+\dfrac{2x}{15}=$ _____

e $\dfrac{8a}{7}+\dfrac{3a}{14}=$ _____

f $\dfrac{6m}{7}+\dfrac{m}{14}-\dfrac{2m}{21}=$ _____

g $\dfrac{8x}{9}-\dfrac{x}{3}+\dfrac{2x}{15}=$ _____

h $\dfrac{9m}{2}+\dfrac{6m}{4}-\dfrac{m}{16}=$ _____

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EXCEL ESSENTIAL SKILLS: YEAR 8 MATHEMATICS REVISION AND EXAM WORKBOOK 2 – EX

Basic algebra

Multiplication and division of algebraic fractions

QUESTION 1 Find the products of these algebraic fractions.

a $\dfrac{a}{3} \times \dfrac{a}{4} = $ _____

b $\dfrac{x}{5} \times \dfrac{y}{6} = $ _____

c $\dfrac{m}{2} \times \dfrac{m}{3} = $ _____

d $\dfrac{p}{4} \times \dfrac{p}{8} = $ _____

e $\dfrac{a}{6} \times \dfrac{3}{x} = $ _____

f $\dfrac{15}{m} \times \dfrac{n}{5} = $ _____

g $\dfrac{5x}{3} \times \dfrac{15}{2x} = $ _____

h $\dfrac{x}{5} \times \dfrac{25}{x^2} = $ _____

i $\dfrac{8}{x^2} \times \dfrac{x}{16} = $ _____

j $\dfrac{2x}{y} \times \dfrac{y^2}{3x} = $ _____

k $\dfrac{ab}{4} \times \dfrac{16}{a^2b} = $ _____

l $\dfrac{5}{xy} \times \dfrac{y}{25} = $ _____

QUESTION 2 Divide the following algebraic fractions.

a $\dfrac{m}{2} \div \dfrac{m}{5} = $ _____

b $\dfrac{y}{7} \div \dfrac{3y}{14} = $ _____

c $\dfrac{p}{8} \div \dfrac{8p}{15} = $ _____

d $\dfrac{x}{3} \div \dfrac{2x}{5} = $ _____

e $\dfrac{5}{n} \div \dfrac{16}{n} = $ _____

f $\dfrac{2a}{5} \div \dfrac{4}{a} = $ _____

g $\dfrac{ab}{6} \div \dfrac{a^2}{12} = $ _____

h $\dfrac{x^2y^2}{9} \div \dfrac{xy}{27} = $ _____

i $\dfrac{3x}{4y} \div \dfrac{9x}{24y} = $ _____

j $\dfrac{5a}{7} \div \dfrac{16a}{8} = $ _____

k $\dfrac{6a}{11} \div \dfrac{5a}{3} = $ _____

l $\dfrac{ab}{5} \div \dfrac{ac}{15} = $ _____

QUESTION 3 Simplify the following.

a $\dfrac{2x}{5} \times \dfrac{7x}{8} = $ _____

b $\dfrac{8x}{13} \div \dfrac{16x}{26} = $ _____

c $\dfrac{a}{b} \div \dfrac{b}{a} = $ _____

d $\dfrac{3a}{5} \div \dfrac{4a}{9} = $ _____

e $\dfrac{9a}{10} \div \dfrac{27a}{20} = $ _____

f $\dfrac{m}{n} \div \dfrac{m}{l} = $ _____

g $\dfrac{15m}{17} \div \dfrac{16m}{34} = $ _____

h $\dfrac{5a}{8} \div \dfrac{6a^2}{10} = $ _____

i $\dfrac{x}{y} \div \dfrac{x}{y} = $ _____

j $\dfrac{7y^2}{8} \div \dfrac{14y}{12} = $ _____

k $\dfrac{a^2b}{10} \div \dfrac{ab}{20} = $ _____

l $\dfrac{x^3}{y^3} \div \dfrac{x^2}{y^2} = $ _____

QUESTION 4 Find answers to the following.

a $\dfrac{6mn}{15} \div \dfrac{m^2}{20} = $ _____

b $\dfrac{m}{8} \div \dfrac{m^3}{32} = $ _____

c $\dfrac{abc}{14} \div \dfrac{ab}{7} = $ _____

d $\dfrac{3m}{4} \div \dfrac{27m}{16} = $ _____

e $\dfrac{mn^2}{6p^2} \div \dfrac{m^2n^2}{12p} = $ _____

f $\dfrac{3x}{y} \div \dfrac{4x}{y^2} = $ _____

g $\dfrac{a^2}{b^2} \times \dfrac{b^3}{a^3} = $ _____

h $\dfrac{ab^2}{c} \times \dfrac{c^2}{a^3b^3} = $ _____

i $\dfrac{3xy}{5} \times \dfrac{20}{x^2y^2} = $ _____

Basic algebra

## Problem solving and algebra

Find the perimeter of each of the following shapes.

1

$3x + 2$

2

$2x$
$2x$
$3x$
$5x$

3

$3x$
$3x + 5$
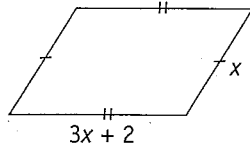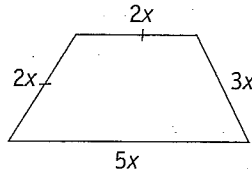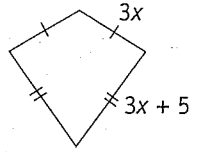
Find the area of each of the following shapes.

4

$5x + 7$
$2x$

5

$3x$

6

$3x - 5$
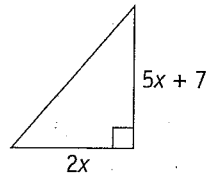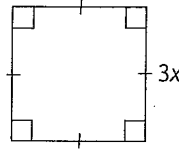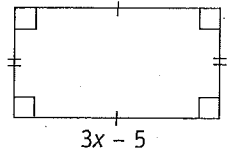
7 Find the sum of $3x$ and $5y$.

8 What is the product of $8m$ and $5n$?

9 Find the average of $6x$, $2x$ and $7x$.

10 Find an expression for 5 more than the sum of 3 and $2x$.

11 Find the area of a square with side length y metres.

12 If the first number is $4x$, write the next consecutive integer.

13 Increase $9x$ by 10 and then decrease this result by $2x$.

14 Find the volume of a cube with side length $2x$ cm.

15 Find the number $(x - 2)$ less than $4x + 5y$.

Basic algebra

TOPIC TEST

PART A

Instructions
- This part consists of 15 multiple choice questions
- Fill in only ONE CIRCLE for each question
- Each question is worth 1 mark
- Calculators may be used

Time allowed: 15 minutes

Total marks = 15

Marks

1 If $a = -4$ and $b = 3$ the value of a^2b is

(A) 48 (B) 144 (C) −24 (D) −48

[1]

2 $a^3 + a^3 =$

(A) a^6 (B) a^3 (C) $2a^6$ (D) $2a^3$

[1]

3 $15x^8 \div 5x^4 =$

(A) $3x^4$ (B) $3x^2$ (C) $10x^4$ (D) $10x^2$

[1]

4 $2a \times 3a \times 4a =$

(A) $9a$ (B) $9a^3$ (C) $24a$ (D) $24a^3$

[1]

5 $\dfrac{1}{x} \div \dfrac{1}{y} =$

(A) $\dfrac{1}{xy}$ (B) $\dfrac{y}{x}$ (C) $\dfrac{x}{y}$ (D) xy

[1]

6 $3x - (-x) =$

(A) 3 (B) $3x$ (C) $3x^2$ (D) $4x$

[1]

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

(A) $7y^2 + 3y$ (B) $7y^2 - 7y$ (C) $7y^3 + 3y$ (D) $7y^4 - 7y$

[1]

8 $7t^3 \times (-4t^2) =$

(A) $3t^5$ (B) $3t^6$ (C) $-28t^5$ (D) $-28t^6$

[1]

9 $3(x + 4) - x =$

(A) 12 (B) 15 (C) $2x + 4$ (D) $2x + 12$

[1]

10 $\left(4x^3\right)^2 =$

(A) $4x^5$ (B) $4x^6$ (C) $16x^5$ (D) $16x^6$

[1]

11 $\dfrac{6a^2}{2ab} =$

    (A) $3ab$ (B) $\dfrac{3a}{b}$ (C) $6b$ (D) $\dfrac{6}{b}$

12 $3ab - b + ab - 2b =$

    (A) $2ab - b$ (B) $2ab - 3b$ (C) $4ab - b$ (D) $4ab - 3b$

13 $\dfrac{x^4 \times x^6}{x^2} =$

    (A) x^5 (B) x^8 (C) x^{12} (D) x^{22}

14 $\left(y^6 \div y^2\right)^2 =$

    (A) y^5 (B) y^6 (C) y^8 (D) y^9

15 The correct factorisation of $2ab - a$ is

    (A) $2a(b - 1)$ (B) $2a(b - a)$ (C) $a(2b - 1)$ (D) $a(2b - a)$

Total marks achieved for PART

Basic algebra

TOPIC TEST

PAF

Instructions
- This part consists of 15 questions
- Each question is worth 1 mark
- Write answers in the 'Answers only' column

Time allowed: 15 minutes		**Total marks = 15**
Questions	**Answers only**	N

1 Simplify $3y - 4y - y$

2 Simplify $6a^2 \times a$

3 Factorise $7x + 14y$

4 If $\dfrac{x}{4} = 11$ find x

5 Expand $3x(2x - 5y)$

6 If $a = 3$, $b = -2$ and $c = 0$, find the value of $3a + 2b - c$

Simplify the following.

7 $\dfrac{6x^3}{x^2}$

8 $\left(3a^2b\right)^2$

9 $\sqrt{49x^2}$

10 $36m^3 - 12m^3$

11 $\dfrac{8a}{9} - \dfrac{3a}{9}$

12 $\dfrac{3x+5}{4} + \dfrac{x}{4}$

13 $\dfrac{xy}{3} \times \dfrac{9}{xy}$

14 $\dfrac{4a}{5} \div \dfrac{a}{10}$

15 $3(a - 4) + 4(a + 2b)$

Total marks achieved for PART B

Basic algebra

TOPIC TEST

Instructions
- This part consists of 4 questions
- Each question is worth 5 marks
- Show all necessary working

Time allowed: 20 minutes   **Total marks = 2**

1 If $a = 2$, $b = -4$ and $c = -6$, find the value of each expression.

    a abc _____

    b $5(a + b + c)$ _____

    c $5ab^2$ _____

    d $3ab + 2c$ _____

    e $a^2 + b^2 - c^2$ _____

2 Simplify.

    a $-7a + 6a + 4a$ _____

    b $6a + 5(3 - a)$ _____

    c $-8(2a + 3b) + a$ _____

    d $\dfrac{9}{a} - \dfrac{5}{a}$ _____

    e $\dfrac{3x}{5} + \dfrac{2x}{17}$ _____

3 Expand and simplify.

    a $9x - 3(x + 5)$ _____

    b $x(3x - 2) - 3(x^2 - x)$ _____

    c $25 - (x + 17)$ _____

    d $-9(x - y) + 3(2x - y)$ _____

    e $-6(a + 2b) - 2(b - a)$ _____

4 Factorise.

    a $3x - x^2$ _____

    b $3p^2q + 12pq^2$ _____

    c Solve $3(x - 1) = 6$ _____

Simplify the following.

    d $5p^2 \times q^5 \times pq$ _____

    e $\dfrac{15a^3b^2}{8ac^2} \div \dfrac{25ab}{(2c)^2}$ _____

Total marks achieved for PART C

_____

Answers

12 $23 072   13 $426.67   14 300   15 $375

1 D   2 C   3 B   4 B   5 D   6 C   7 D   8 C   9 D   10 A   11 C   12 D   13 C   14 B   15 C

Page 34   1 9   2 $16\frac{2}{3}$ 3 750   4 93   5 198 kg   6 817   7 60%   8 74%   9 375   10 99.36   11 12   12 $\frac{22}{25}$ 13 90

14 $\frac{33}{50}$ 15 900

Page 35   1 a 90   b 6   c 52   d 340   e 165   2 a 140 cm   b $221   c 4.505 L   d 2.94 h   e 105   3 a $\frac{11}{20}$, 0.55

b $\frac{17}{20}$, 85%   c 1250%, 12.5   d $\frac{1}{16}$, 0.0625   e 60%, 0.6   4 a 48%   b 25%   c 124%   d $312   e $64

Page 36   1 a $11x$ b $16x$ c $16x$ d $27x$ e $41x$ f $45x$ g $14xy$ h $20mn$ i $38a$ j $18x$ k $42a^2$ l $19p$ 2 a $4a$ b $8a$ c $5a$ d $15x$ e $7m$ f $4y$ g $6x$ h $2xy$ i $22x^2$ j $8y$ k $5x$ l $11p$ 3 a $12a$ b $8x$ c $14a$ d $14a$ e $20xy$ f $8mn$ g $9x^2$ h $13a^2$ i $5x$ j $16t$ k $10m$ l $12a$ 4 a $3x+5y$ b $9a+11b$ c $5m+2n$ d $4x^2$ e $2a+5b$ f $14a-6b$ g $15y-7x$ h $6xy$ 5 a $22-10x$ b $3m+3n$ c $19x-2y$ d $11x^2-7y^2$ e $8m+2n$ f $6xy+6yz$ g $9a+6b$ h $3a+6b$ i $6t+3$ j $18ab$

Page 37   1 a $10a$ b $18b$ c $72y$ d $21y$ e $-6ab$ f $6a$ g $-3ab$ h $6ab$ i $18x$ j $-45a^2b$ k $16a^2$ l $12x^2$ 2 a $18ab$ b $6x^2$ c $40xy$ d $24y^2$ e $27ab$ f $-30a^2$ g $48y^2$ h $6t^2$ i $54x^2y$ j $-30a^2b$ 3 a $2a^2b$ b $90a$ c $30a^2bc$ d $a^2b^2c^2$ e $-54ab^2c$ f $42a^2p$ g $-40x$ h $6xy^2$ 4 a $40ab$ b $14k^2$ c $-72x^2y^2$ d $8a^3x^2$ e $36m^2$ f $24m^2t$ g $3y^3$ h $-30x^2$ 5 a $-8a^2b^2$ b $-84a^2$ c $-18x^2y$ d $30abc$ e $-4a^2b$ f $-x^2y$ g $25p^2$ h $-36a^2$

Page 38   1 a $3a$ b $3pq$ c $\frac{4}{5m}$ d $3x$ e $3y$ f $6a$ g $2a$ h $9x$ i $\frac{3}{y}$ 2 a 3   b $4y$ c $3n$ d $8m$ e $-x$ f $8b$ g 4   h $8a$ i $4y$ j $-3b$ k $3b$ l $4x$ 3 a $-3x$ b $-2b$ c $2y$ d $3x$ e $3y$ f 4   g $4x^2$ h $12y$ i $-5q$ j $10n$ 4 a -4 b 17   c $-8x$ d -2 e $2x$ f $6m$ g $5y$ h $8b$ 5 a $-4b$ b $4x$ c -1 d $9y$ e 1   f $\frac{ab}{c}$ g $\frac{3}{b}$ h $2x$

Page 39   1 a $16a^2$ b $60a^2c$ c $15a^2$ d $288a^4$ e $-27x^2$ f $-36a^3$ g $45x^3y$ h $15y^3$ i $96a^2b$ j $72a^3$ k $3a^4b$ l $9a^3b^3$

2 a 5   b 9   c 6   d 25   e $-2q$ f $-7x$ g $-4b$ h $-4a$ i $4p$ j $4yz$ k 5   l $-9n$ 3 a -9 b $\frac{-5b}{a}$ c -1 d $7abc$ e 3

f $7t$ g $4y$ h $-5b$ i $\frac{5}{2}$ j $-5a$ 4 a $-15a^2$ b $40abc$ c $-56x^2$ d $48a^3$ e $-30a^2b$ f $-40x^2y$ g $36a^3b^2$ h $-a^4b^4$ i $8xy^3$

j $-15x^2y$ 5 a 6   b 12   c $\frac{10}{3}$ d $4b^2$ e $6ab$ f $-x$

Page 40   1 a a^5 b $6p^5$ c y^{11} d m^7 e $32a^8$ f x^{15} g x^{12} h $72a^9$ i $80p^{11}$ j x^{20} k a^7b^7 l $36x^7y^5$ 2 a a^4 b $4m^2$ c $4ab$ d a^8 e k^5 f $2a^2b^5$ g a^{12} h $4a^2$ i $-9x^{10}y$ j m^7 k m^2n^2 l $8a^2b^2$ 3 a a^6 b y^{20} c $64x^4y^6$ d m^{10} e x^{21} f $729a^3b^6$ g x^{24} h $64a^6$ i $125m^{12}$ j a^{42} k $81p^4$ l $1000a^9b^9$ 4 a 1   b 1   c 9   d 1   e 1   f 2   g 1   h 1   i 1

5 a x^7 b p^4q c a^{14} d m^9 e $64p^4$ f x^6 g $30x^5$ h $9m^6n$ i $3x^3$ 6 a $12a^{12}$ b $2ab^4$ c a^2 d $9a$ e $\frac{4a^2}{b^2}$ f $45a^2b^2$ g x^3 h a^6b^3 i $4xy$

Page 41   1 a $3x+3y$ b $10a+15b$ c $8a+12$ d $48a-42b$ e $8m+24p$ f $15a-12m$ g $5x^2+40x$ h $7x-35$ i $9a^2-18ab$ j $24x-36$ k $12am+6mn$ l $45x-105$ 2 a $-3x-6$ b $-10x^2-5x$ c $-4x+14$ d $-16x^2+6xy$ e $-12x+15$ f $-xy-y^3$ g $-64x+72$ h $-3m^2-8m$ i $-2x^2-2x$ j $-16n+10mn$ k $-6x^2-15x$ l $-12t^2+18t$ 3 a $10x+35$ b $21x-77$ c $-12x+27$ d $-8x-20$ e $48y+24$ f $-15a^2-15a$ g $-2x^2-7x$ h $-8m^2+5m$ i $-6t^2-10t$ j $16a^2+24ab$ k $-24x^2+40x$ l $12p^2-18mp$ 4 a $7x+6$ b $11y+17$ c $2xy-35$ d $p-70$ e $2y^2+12y$ f $5x+6$ g $12p-24$ h $9m-16$ i $8m^2+9m$ j $4x-26$ k $5t-24$ l $3x+54$ 5 a $6m+14$ b $2x+18$ c $19x+62$ d $8x+76$ e $3y+37$ f $17x+24$ g $5n-32$ h $2x^2-3$

Page 42   1 a 28   b 336   c $2\frac{1}{3}$ d 784   e 4032   f 209   g 23   h 37   i -11 j 71   k 1316   l 380   2 a 27   b 1   c 7   d 69   e 96   f 88   g 50   h 64   i 3   j 45   k 48   l -33 3 a 10.7   b 17.1   c 34.2   d 23.13   e 114.49   f 483.84   g 425.088   h 5.0   i 0.2   j 4.1   k 8.8   l 3.9   4 a 138   b 50   c 360   d -18 e 32   f 11   g 212   h -5 i 30

Page 43   1 a $7(x+1)$ b $2(5a-1)$ c $7(y+2)$ d $4(2x-1)$ e $3(a+5)$ f $4(x-3y)$ g $3(y+1)$ h $5(m+6)$ i $4(8x-7)$ j $5(a-1)$ k $2(3a-b)$ l $5(a+7)$ 2 a $y(y+3)$ b $3y^2(2y-1)$ c $3x^2(2x-1)$ d $2m(m+3)$ e $4a(2a-1)$ f $m(m-9)$ g $8a(a+3)$ h $3y(5y-2)$ i $8a(2a-1)$ j $x(x+9)$ k $3a^2(3a-2)$ l $7x(4x-1)$ 3 a $-3(x+1)$ b $-4(y^2-4)$ c $-3(2n+1)$ d $-5(x+8)$ e $-3(x-9)$ f $-7(t+2)$ g $-2(m^2+2)$ h $-5(m^2-7)$ i $-11(x^2+2)$ j $-6(a^2-2)$ k $-8(a^2+4)$ l $-13(y-3)$ 4 a $-6x(x+2)$ b $-4x(4x+1)$ c $-3(2x+3)$ d $-4y(2x+1)$ e $-9x^2(x-3)$ f $-5x(3x+y)$ g $-3(2mn+1)$ h $-5xy(xy-5)$ i $-3m(2n-5m)$ j $-4xy(2z-1)$ k $-3x(3x+5)$ l $-x(1+3y)$ 5 a $8(a+2b)$ b $5(a-5)$ c $4(2x-y)$ d $9(a-b)$ e $8(1-t)$

Answers

f $m^2(m - 4)$ **g** $a(16b - a)$ **h** $7(2m - 1)$ **i** $8ab(2 - a)$ **j** $5xy(3xy - 1)$ **k** $-6(m + 6)$ **l** $-4(m + 3n)$ **6 a** $3(a + b + c)$
b $p(16q - 7)$ **c** $-x(x + 7)$ **d** $8(x + y - 2z)$ **e** $x(t - 1)$ **f** $5(3a + b - 2c)$ **g** $4(x - 2y)$ **h** $y^2(y - 1)$ **i** $3(6x - 3y + 2)$ **j** $16(x - 2y)$
k $3n(5m - 1)$ **l** $3(2a^2 + a + 3)$ **m** $m(m - 2n)$ **n** $q(8p - q)$ **o** $-6(x + xy + 2)$

PAGE 44 **1 a** $\dfrac{x}{4}$ **b** x **c** $\dfrac{17x}{15}$ **d** $\dfrac{2a}{9}$ **e** $\dfrac{2x}{7}$ **f** $\dfrac{y}{3}$ **g** $\dfrac{7x}{12}$ **h** $\dfrac{25a}{63}$ **i** $\dfrac{13a}{14}$ **j** $\dfrac{46x}{35}$ **k** $\dfrac{11m}{9}$ **l** $\dfrac{29a}{35}$ **2 a** $\dfrac{a}{3}$

b $\dfrac{2x}{7}$ **c** $\dfrac{10y}{11}$ **d** $\dfrac{4m}{13}$ **e** $\dfrac{p}{12}$ **f** $\dfrac{x}{3}$ **g** $\dfrac{4x}{21}$ **h** $\dfrac{x}{24}$ **i** $\dfrac{y}{36}$ **j** $\dfrac{x}{20}$ **k** $\dfrac{3a + 2}{14}$ **l** $\dfrac{14x + 3}{12}$ **3 a** $\dfrac{19x}{6}$ **b** $\dfrac{x}{20}$ **c** $\dfrac{3x}{4}$

d $\dfrac{-x}{8}$ **e** $\dfrac{4x}{3}$ **f** $\dfrac{2x}{3}$ **g** $\dfrac{5x}{9}$ **h** $\dfrac{95m}{16}$ **i** $\dfrac{37x}{50}$ **j** $\dfrac{13x}{72}$ **k** $\dfrac{7x}{16}$ **l** $\dfrac{71m}{50}$ **4 a** $\dfrac{5p}{9}$ **b** $\dfrac{45y}{8}$ **c** $\dfrac{17a}{30}$ **d** $\dfrac{19x}{30}$ **e** $\dfrac{19a}{14}$

f $\dfrac{5m}{6}$ **g** $\dfrac{31x}{45}$ **h** $\dfrac{95m}{16}$

PAGE 45 **1 a** $\dfrac{a^2}{12}$ **b** $\dfrac{xy}{30}$ **c** $\dfrac{m^2}{6}$ **d** $\dfrac{p^2}{32}$ **e** $\dfrac{a}{2x}$ **f** $\dfrac{3n}{m}$ **g** $12\dfrac{1}{2}$ **h** $\dfrac{5}{x}$ **i** $\dfrac{1}{2x}$ **j** $\dfrac{2y}{3}$ **k** $\dfrac{4}{a}$ **l** $\dfrac{1}{5x}$ **2 a** $\dfrac{5}{2}$ **b** $\dfrac{2}{3}$

c $\dfrac{15}{64}$ **d** $\dfrac{5}{6}$ **e** $\dfrac{5}{16}$ **f** $\dfrac{a^2}{10}$ **g** $\dfrac{2b}{a}$ **h** $3xy$ **i** 2 **j** $\dfrac{5}{14}$ **k** $\dfrac{18}{55}$ **l** $\dfrac{3b}{c}$ **3 a** $\dfrac{7x^2}{20}$ **b** 1 **c** $\dfrac{a^2}{b^2}$ **d** $\dfrac{27}{20}$ **e** $\dfrac{2}{3}$ **f** $\dfrac{l}{n}$ **g** $\dfrac{15}{8}$

h $\dfrac{25}{24a}$ **i** 1 **j** $\dfrac{3y}{4}$ **k** $2a$ **l** $\dfrac{x}{y}$ **4 a** $\dfrac{8n}{m}$ **b** $\dfrac{4}{m^2}$ **c** $\dfrac{c}{2}$ **d** $\dfrac{4}{9}$ **e** $\dfrac{2}{mp}$ **f** $\dfrac{3y}{4}$ **g** $\dfrac{b}{a}$ **h** $\dfrac{c}{a^2b}$ **i** $\dfrac{12}{xy}$

PAGE 46 **1** $8x + 4$ **2** $12x$ **3** $12x + 10$ **4** $5x^2 + 7x$ **5** $9x^2$ **6** $6x^2 - 10x$ **7** $3x + 5y$ **8** $40mn$ **9** $5x$ **10** $2x + 8$ **11** y^2 m^2
12 $4x + 1$ **13** $7x + 10$ **14** $8x^3$ cm^3 **15** $3x + 5y + 2$

PAGES 47 & 48 **1** A **2** D **3** A **4** D **5** B **6** D **7** A **8** C **9** D **10** D **11** B **12** D **13** B **14** C **15** C

PAGE 49 **1** $-2y$ **2** $6a^3$ **3** $7(x + 2y)$ **4** $x = 44$ **5** $6x^2 - 15xy$ **6** 5 **7** $6x$ **8** $9a^4b^2$ **9** $7x$ **10** $24m^3$ **11** $\dfrac{5a}{9}$ **12** $\dfrac{4x + 5}{4}$
13 3 **14** 8 **15** $7a + 8b - 12$

PAGE 50 **1 a** 48 **b** -40 **c** 160 **d** -36 **e** -16 **2 a** $3a$ **b** $a + 15$ **c** $-15a - 24b$ **d** $\dfrac{4}{a}$ **e** $\dfrac{61x}{85}$ **3 a** $6x - 15$ **b** x

c $8 - x$ **d** $-3x + 6y$ **e** $-4a - 14b$ **4 a** $x(3 - x)$ **b** $3pq(p + 4q)$ **c** $x = 3$ **d** $5p^3q^6$ **e** $\dfrac{3ab}{10}$
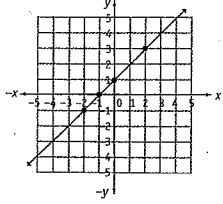
PAGE 51 **1 a** $1:2$ **b** $1:3$ **c** $1:3$ **d** $1:6$ **e** $1:7$ **f** $1:12$ **g** $1:9$ **h** $1:8$ **i** $1:9$ **j** $1:4$ **k** $1:5$ **l** $1:9$ **2 a** $5:13$ **b** $1:3$
c $1:3$ **d** $2:19$ **e** $1:13$ **f** $2:21$ **g** $2:9$ **h** $1:13$ **i** $3:14$ **j** $2:11$ **k** $2:15$ **l** $4:9$ **3 a** $1:3:5$ **b** $3:1$ **c** $9:16$ **d** $3:4$ **e** $1:5$
f $5:1$ **g** $1:3$ **h** $5:7$ **i** $6:13$ **j** $5:6$ **k** $12:1$ **l** $1:5$ **4 a** $4:21$ **b** $4:15$ **c** $1:6$ **d** $2:5$ **e** $3:4$ **f** $1:7$ **g** $8:25$ **h** $2:3$ **i** $5:2$
j $4:5$ **k** $10:1$ **l** $5:4$ **5 a** $6:25$ **b** $1:15$ **c** $5:18$ **d** $3:1$ **e** $7:18$ **f** $8:1$ **g** $5:7$ **h** $7:8$

PAGE 52 **1 a** 20 kg, 160 kg **b** $\$10$, $\$35$ **c** $\$168$, $\$672$ **d** $\$300$ **e** $\$800$ **2 a** 25 cm **b** 15 **c** $40°, 60°, 80°$ **d** $16:25$
e 9 **3 a** 28 m **b** $\$36$, $\$60$ **c** $3:10$ **d** $\$1200$, $\$1600$, $\$2000$

PAGE 53 **1 a** 80 km/h **b** $\$20$ **c** $5\frac{1}{3}$ L / min **d** $\$7.95$ **2 a** 1 **b** 960 **c** 3600 **d** $\$300$ **e** 1800 **f** $0.6°$
3 a 80 km/h **b** 108 km **c** 48.6 L **4 a** 2.5 km/min **b** 0.027 km / s **c** 136 **5 a** 168.75 km/h **b** 2.58 m/y **c** 37
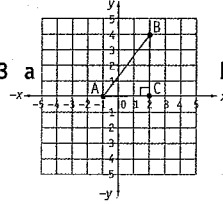
PAGE 54 **1 a** $1:1500$ **b** $1:200$ **c** $1:30\,000$ **d** $1:5000$ **e** $3:500$ **f** $1:40$ **g** $1:30\,000$ **h** $3:10$ **i** $1:8000$ **2 a** 1 m
b 4 m **c** 6 m **d** 50 cm **e** 70 cm **f** 2 km **g** 60 cm **h** 80 cm **i** 1.5 km **3 a** 4 m **b** 100 m **c** 8 km **d** 75 m **e** 9.3 km
f 23.45 km **g** 9 m **h** 15.2 km **i** 48.25 km **4 a** 6 cm **b** 7 cm **c** 13.8 cm **d** 0.5 cm **e** 50 cm **f** 39.65 cm
5 a 4.8 m $\times$ 5.6 m **b** 0.58 m

PAGE 55 **1 a**   **b** yes **c** see diagram **d** $y = x + 1$ **2 a** $y = 2x + 1$ **b** $(-1, -1)$,

x	-1	0	1	2
y	-1	1	3	5
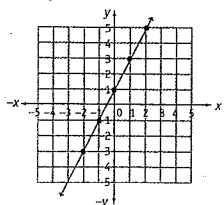
$(0, 1)$, $(1, 3)$, $(2, 5)$ **c**   **d** yes **3 a**   **b** right-angled triangle **c** 3 units **d** 4 units