9/10-A

Expressions, Equations and Inequalities

Booklet 2

Name:

Start Date:

End Date:

9/10 - A will learn to:

- [ ] Use algebraic symbols to represent words
- [ ] Use like terms to add / subtract
- [ ] Multiply and divide algebraic expressions
- [ ] Expand and factorise expressions
- [ ] Four operations with algebraic fractions
- [ ] Solve linear eq. with letters on one side
- [ ] Solve linear eq. with letters on both sides
- [ ] Solve linear eq. with brackets
- [ ] Solve linear eq. with fractions
- [ ] Solve eq. with substitution
- [ ] Solve word problems
- [ ] Use powers.
- [ ] Index laws, multiplying / dividing / zero / negativ
- [ ] Inequalities on number lines
- [ ] Solving simple inequalities.

Name : _____ Score : _____

Teacher : _____ Date : _____

Translate Algebraic Expressions

1) Take away 4 from p _____

2) 5 is added to q _____

3) 3 times d _____

4) x minus 6 _____

5) Product of 2 and q _____

6) 7 minus g _____

7) Sum of x and 7 _____

8) 3 divided by c _____

9) w is added to 3 _____

10) c divided by 2 _____

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Adding Like Terms

Level 1

① $5s + 2s =$

② $3p + 7p =$

③ $10q - 2q =$

④ $5k + 2k - 3k =$

⑤ $11f + 9f - 3f =$

⑥ $8q - 5q + 10q =$

⑦ $20k + 3k - k =$

⑧ $f + f + f + f =$

⑨ $2z - 3z + 4z =$

⑩ $j - 4j + 6j =$

Level 2

① $5p - 7p =$

② $8f - 11f =$

③ $k - 3k =$

④ $-5p + 7p =$

⑤ $-2p + 3p - 5p =$

Level 3

* don't forget not to mix apples and bananas *

① $3a + 2a + b =$

② $4b - 3a + 5a =$

③ $10x + 2x - 3y =$

④ $12p + 3p + 2a + 5a =$

⑤ $7d - 5d + 3e + 5e =$

⑥ $12x + 2y + 3x + 5y =$

⑦ $7q + 3p + 2q + 4p =$

⑧ $9f - 11f + 3k - 5k =$

⑨ $12a - 15a + 3b + 7b =$

⑩ $8m + 9m^2 + 2m - 10m^2 =$

⑪ $a + 3a + 4b + b - 3b =$

⑫ $9g + 3h - 12g - 5h + h =$

⑬ $10w - 7k + 2k + w =$

⑭ $5h - 3k + 3h + 7k =$

⑮ $20a - k + 3a + 5k =$

Name : _____ Score : _____

Teacher : _____ Date : _____

Combining Like Terms

1) 8 - 5b + 6b

2) 3s + 4s

3) 3 + 8 + 2p - 7p

4) 7f - 9f

5) 2w + 3 + 8w

6) 2b - 5b - 3

7) 2m + m

8) -9h + 8 - 2h - 6

9) 2n - 7 - 6 + 8n

10) 2 - 9f + 7 - 5f

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CHAPTER 4
Basic algebra

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UNIT 1: 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** $6ab + 3ba + 9ab =$ _____

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

1. $6x \div 2 =$

2. $8m \div 2 =$

3. $\frac{9m}{3} =$

4. $\frac{12y}{6} =$

5. $\frac{6ab}{12a^2b} =$

6. $\frac{16xy}{12y} =$

7. $\frac{2x^2yz}{8xz} =$

8. $-21x \div 3 =$

9. $\frac{70ab^2}{4b} =$

10. $\frac{8mn}{18n} =$

11. $\frac{28xyz}{14x} =$

12. $(-16k) \div (-4k) =$

13. $15ab \div (-5a) =$

14. $\frac{36xy^3}{4x^2y^2} =$

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UNIT 3: Division of pronumerals

QUESTION 1 Work out the following divisions.

a $\frac{18a}{6} =$ _____ b $\frac{9pq}{3} =$ _____ c $\frac{12m}{15m^2} =$ _____

d $\frac{15x}{5} =$ _____ e $\frac{21xy}{7x} =$ _____ f $\frac{18a^2}{3a} =$ _____

g $\frac{12a}{6} =$ _____ h $\frac{36x^2}{4x} =$ _____ i $\frac{30y}{10y^2} =$ _____

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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UNIT 4: 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 $\dfrac{(-2x) \times (-3) \times (-5x)}{-6x \times -5} =$ _____

Challenge

Don't be tricked between + and ×

① $a \times a \times a \times a =$

② $a + a + a + a =$

③ $2b \times 3b =$

④ $2b + 3b =$

⑤ $9 \times w \times 2 \times p =$

⑥ $10 + 2w - 5 + 3w =$

⑦ $-3 \times -2 \times p \times p =$

⑧ $-7p + 3d - 11p - 5d =$

⑨ $7w \times 3w \times 2q =$

⑩ $7w + 3w - 2q =$

Four operations with integers

Pages 16–17

UNIT 7: Order of operations

QUESTION **1** Follow the correct order of operations when finding answers to these.

a $2 + 3 \times 5$

b $12 - 5 \times 3$

c $-3 + 21 \div 3$

d $3 \times 4 - 6 \times 2$

e $-3 \times 7 + 4 \times 8$

f $-9 - 2 \times -6$

g $16 \div 8 - 3$

h $5 - 12 \div 3$

i $-5 \times 20 \div 4$

j $-24 \div 6 + 7$

k $28 \div 7 - 18 \div 2$

l $3 \times -5 - 2 \times -7$

QUESTION **2** Remove the grouping symbols and simplify.

a $(-5 + 8) \times 2$

b $(3 - 7) \times (2 - 5)$

c $-8 + (7 - 3) \div -2$

d $12 \times (-7 + 2)$

e $56 - 2 \times (5 - 9)$

f $(-6 + 14) \div (-5 + 1)$

g $(-3 + 9) \div (-2 \times 3)$

h $36 \div (1 - 4 - 6)$

i $-11 - (2 + 3 \times 4)$

QUESTION **3** Find answers to the following.

a $[(12 - 5) - (3 - 4)] \times -3$

b $9 \times [6 - (5 - 8)]$

c $[4 + (2 - 7) \times 3] \times (-2 + 7)$

d $12 - (-9 + 4) \times 3 \times -2$

e $[(5 + 8) \times (3 - 4) + 6] \times -1$

f $72 \div (-3 + 9) - 56 \div (-2 - 6)$

g $[3 + 12 \div (-2 + 8)] - 5$

h $[-1 - (2 + 3) - 7] \times -2$

i $3 \times [6 \times (4 - 7) \div (-2 + 11)]$

QUESTION **4** Insert grouping symbols to make these statements correct.

a $5 + 7 \div 6 = 2$

b $-3 + 5 \times -1 = -2$

c $5 \times 4 - 6 \times 3 = -30$

d $6 + 3 \times 5 \div -7 = -3$

e $-4 + 7 - 9 \times 2 = -12$

f $54 \div -9 - 2 + 7 = -15$

g $-4 \times 7 - 5 \times -2 = 66$

h $7 - 10 \times 3 - 8 = 15$

i $10 - 7 + 4 \times -3 \div 12 = 4$

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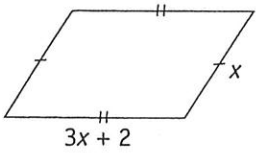
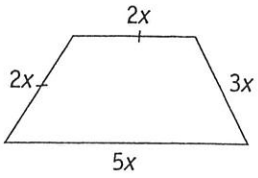
UNIT 11: Problem solving and algebra

Find the perimeter of each of the following shapes.

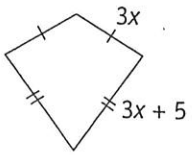
1



2

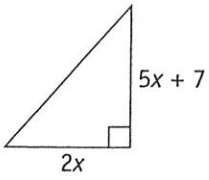


3

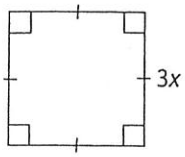


Find the area of each of the following shapes.

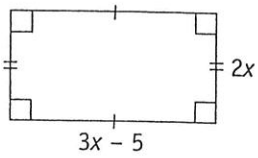
4



5



6



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 $4x + 5y$.

Four operations with integers

Pages 16–17

UNIT 6: Indices

QUESTION 1 Evaluate the following.

a $2^3 =$ _____ **b** $5^2 =$ _____ **c** $-3^3 =$ _____

d $3^2 =$ _____ **e** $4^2 =$ _____ **f** $(-1)^2 =$ _____

g $5^3 =$ _____ **h** $8^2 =$ _____ **i** $(-1)^3 =$ _____

j $4^3 =$ _____ **k** $(-2)^3 =$ _____ **l** $(-1)^4 =$ _____

m $2^5 =$ _____ **n** $(-3)^4 =$ _____ **o** $(-2)^4 =$ _____

p $(-3)^4 =$ _____ **q** $-5^2 =$ _____ **r** $(-5)^3 =$ _____

QUESTION 2 Evaluate the following.

a $(-1)^{10} =$ _____ **b** $(-5)^4 =$ _____ **c** $(-5)^3 =$ _____

d $(-1)^{15} =$ _____ **e** $(-2)^5 =$ _____ **f** $2 \times (-4)^2 =$ _____

g $(-1)^{99} =$ _____ **h** $(-10)^3 =$ _____ **i** $(-8)^2 =$ _____

j $(-6)^3 =$ _____ **k** $(-2)^6 =$ _____ **l** $-4 \times (-3)^3 =$ _____

m $(9)^2 =$ _____ **n** $(7)^3 =$ _____ **o** $(-2)^2 \times (-5)^2 =$ _____

p $(-4)^3 =$ _____ **q** $(3)^4 =$ _____ **r** $-6 \times (-3)^3 =$ _____

QUESTION 3 Calculate the following.

a $(-2)^3 \times (-3)^2 =$ _____ **b** $(-9)^2 - (-4) =$ _____ **c** $(-4)^3 + (-1)^2 =$ _____

d $4^2 + (-5)^2 =$ _____ **e** $(-5)^2 + (-10)^2 =$ _____ **f** $(-8)^2 \div (2)^5 =$ _____

g $(-1)^5 + (-3)^3 =$ _____ **h** $(-7)^2 \times (-1)^3 =$ _____ **i** $(-5)^3 + -5^2 =$ _____

j $8^2 \div (-2)^4 =$ _____ **k** $(-3)^4 - (-5)^2 =$ _____ **l** $(-6)^2 \times (-2)^3 =$ _____

m $7^2 \times (-3)^2 =$ _____ **n** $6^3 + (-2)^3 =$ _____ **o** $(-10)^4 \div 10^2 =$ _____

p $(-2)^2 + (-2)^3 =$ _____ **q** $(-2)^4 + (-3)^3 =$ _____ **r** $8^3 \div (-2)^5 =$ _____

QUESTION 4 Evaluate the following.

a $9^2 \div 3 - 4^2 \times 2 =$ _____ **b** $(-4)^3 \div -4^3 =$ _____ **c** $(-3)^2 \div -3^2 =$ _____

d $4 \times (-2)^2 + 5 \times (-1)^4 =$ _____ **e** $(-10)^2 \times 5^2 =$ _____ **f** $2^5 \div 2^2 =$ _____

g $2 \times 10^3 + (-10)^2 =$ _____ **h** $(-5)^2 + 4 \times -10 =$ _____ **i** $(-10)^2 \times (-10)^3 =$ _____

j $-6 \times (-10)^3 \times (-1)^5 =$ _____ **k** $(-8)^2 + 2 \times -20 =$ _____ **l** $(-5)^3 + (-3)^2 =$ _____

m $(-9)^2 + 3 \times -6 =$ _____ **n** $3 \times (-4)^2 + 8 \times (-2)^4 =$ _____ **o** $(-6)^3 - (-5)^2 =$ _____

p $(-3)^2 + 3^2 + (-1)^2 =$ _____ **q** $(-10)^3 + (-10)^2 - (-2)^6 =$ _____ **r** $-5 \times (-10)^2 \times -10 =$ _____

UNIT 5: Indices

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

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

Expanding

Level 1

$2(x + 3) =$

$4(x - 2) =$

$5(x + 3) =$

$3(4 + x) =$

$2(7 - x) =$

Level 2

$x(x + 4) =$

$p(p - 5) =$

$2x(x - 5) =$

$4x(3 - x) =$

$5x(y + 4) =$

Pages 43–64

UNIT 12: Applying the distributive law to expand algebraic expressions

QUESTION **1** Expand the following expressions.

a $5(a + 3) =$ _____ **b** $6(x - 7) =$ _____ **c** $-2(6 + a) =$ _____

d $-5(x + 7) =$ _____ **e** $9(2a + 5) =$ _____ **f** $3(5x - 9) =$ _____

g $2a(6 + 3a) =$ _____ **h** $x(2x - 5) =$ _____ **i** $m(6m + 3) =$ _____

j $5x(x - 3) =$ _____ **k** $7n(2n - 3) =$ _____ **l** $-3a(a - 2) =$ _____

m $-2(a + 5) =$ _____ **n** $-7(3p - 4) =$ _____ **o** $5a(a - 1) =$ _____

p $-3x(2x - 2) =$ _____ **q** $-(x + 9) =$ _____ **r** $-(4y - 7) =$ _____

QUESTION **2** Expand and simplify by collecting like terms.

a $3(x + 5) + 6x =$

_____

_____

b $6(a - 5) - 5a =$

_____

_____

c $4(m - 3) + 2m =$

_____

_____

d $2(x - 3) + 3x + 7 =$

_____

_____

e $6y(y + 4) - 2y^2 =$

_____

_____

f $6(m - 2) - 3m =$

_____

_____

g $5x + 3(10 - x) =$

_____

_____

h $9x + 3(x - 2) =$

_____

_____

i $6m - 2(m + 1) =$

_____

_____

QUESTION **3** Expand and simplify.

a $3(x + 2) + 4(x - 2) =$

_____

_____

b $8(m - 3) + 3(m - 2) =$

_____

_____

c $5(p - 7) + 3(p + 2) =$

_____

_____

d $8(x + 3) + 2(x - 1) =$

_____

_____

e $4(x + 3) - 2(x + 1) =$

_____

_____

f $x(x + 1) - (x - 3) =$

_____

_____

g $5(p - 6) - 2(p - 1) =$

_____

_____

h $p(5p + 6) - 3(2p - 3) =$

_____

_____

i $2m + 3(m - 3) + 7 =$

_____

_____

UNIT 6: Grouping symbols

Pages 37–38

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

Factorise

Level 1

$x^2 + 3x =$

$x^2 - 4x =$

$2x + 6 =$

$3x + 12 =$

$4x + 8 =$

$5x - 20 =$

Level 2

$2x^2 - 4x =$

$6x + 3 =$

$5xy + 10y =$

$12x + 14 =$

$9y - 15 =$

UNIT 13: Common factors

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

a $5a + 5 =$ _____ **b** $8x - 8 =$ _____ **c** $3y - 3 =$ _____

d $2x + 2 =$ _____ **e** $6m + 6 =$ _____ **f** $7m + 7 =$ _____

g $3p + 6 =$ _____ **h** $4q + 8 =$ _____ **i** $6x - 9y =$ _____

j $4x - 16 =$ _____ **k** $9b - 18 =$ _____ **l** $5a + 20 =$ _____

m $2a + 6 =$ _____ **n** $3m + 12 =$ _____ **o** $6n - 24 =$ _____

p $8x - 32 =$ _____ **q** $3a + 15 =$ _____ **r** $2a + 14 =$ _____

QUESTION **2** Factorise by taking the common factor out.

a $3a + 3b =$ _____ **b** $5m + 5n =$ _____ **c** $6p - 6q =$ _____

d $7a + 14b =$ _____ **e** $3l - 9m =$ _____ **f** $m^2 + 7m =$ _____

g $y^2 + 6y =$ _____ **h** $9x - 18y =$ _____ **i** $3a - 24b =$ _____

j $4x + 4y =$ _____ **k** $mp - 3p =$ _____ **l** $8x - 32y =$ _____

m $6x - 36 =$ _____ **n** $3m + 12m^2 =$ _____ **o** $5y - y^2 =$ _____

p $9x - 6 =$ _____ **q** $8m - 8n =$ _____ **r** $6x - 3x^2 =$ _____

s $2x^2 - 4x =$ _____ **t** $6pq - 12p^2 =$ _____ **u** $10x - 10y =$ _____

QUESTION **3** Factorise the following.

a $-3x + 6 =$ _____ **b** $-5x + 10 =$ _____ **c** $-4x + 8 =$ _____

d $-6x + 18 =$ _____ **e** $-2x + x^2 =$ _____ **f** $-6a + 24 =$ _____

g $-3a + 12 =$ _____ **h** $-4a + 16 =$ _____ **i** $-6a - 12 =$ _____

j $-4y - 8 =$ _____ **k** $-2x - 10 =$ _____ **l** $-8y - 4x =$ _____

m $-3p - 9q =$ _____ **n** $-5x - 25 =$ _____ **o** $-x - 5 =$ _____

QUESTION **4** Factorise.

a $7a + 7b =$ _____ **b** $4a - 20 =$ _____ **c** $9x - 9y =$ _____

d $3m + 15 =$ _____ **e** $6 - 6t =$ _____ **f** $m^2 - 4m =$ _____

g $5ab - a^2 =$ _____ **h** $7m - 14n =$ _____ **i** $8ab - 6a^2b =$ _____

j $-4 - 12a =$ _____ **k** $-3 - 15p =$ _____ **l** $-3m - 6n =$ _____

m $9m - 36 =$ _____ **n** $-4a - 20a^2 =$ _____ **o** $-x - 7 =$ _____

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UNIT 4: Three-step equations

Pages 101–102

QUESTION **1** Solve the following three-step equations.

a $3a - 7 = a + 5$

b $8x + 4 = 6x - 8$

c $4a - 11 = 7a - 17$

d $7t + 10 = 6t - 5$

e $12a + 18 = 4a - 14$

f $\frac{3y}{2} + 1 = 7$

g $3y + 9 = 6y - 3$

h $4 - 3x = 7 - 4x$

i $2m - 9 = 5m - 15$

QUESTION **2** Solve the following equations.

a $5x + 7 = 6x - 8$

b $3a + 10 = 24 + a$

c $6x - 3 = 2x + 13$

d $8a - 7 = 5a - 4$

e $x - 21 = 8x - 7$

f $14x - 28 = 32 - 6x$

g $5m - 3 = 2m + 9$

h $2x - 14 = x + 10$

i $5x + 13 = -5 - 4x$

QUESTION **3** Solve these equations.

a $7a - 14 = 5a + 42$

b $2x - 12 = x - 6$

c $6x - 27 = 3x + 9$

d $4y + 1 = 3y - 3$

e $8m - 7 = 7m + 9$

f $3x + 4 = 2x - 8$

g $5y - 7 = 3y + 9$

h $2y + 7 = y + 8$

i $3y - 5 = 2y + 7$

j $9t - 9 = 10t + 30$

k $2t + 5 = 5t + 4$

l $35x + 21 = -28x - 105$

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UNIT 5: Equations with grouping symbols

QUESTION **1** Solve the following equations.

a $3(x+2)=6$

b $2(a+1)=8$

c $5(m-2)=25$

d $5(4a-3)=15a$

e $3(x+5)=18$

f $4(a-4)=24$

g $5(2x+3)=35$

h $3(m+2)=m+10$

i $2(3x+4)=24$

QUESTION **2** Solve these equations.

a $5(a-4)=70$

b $7(x+8)=-14$

c $4(2t-1)=24$

d $4(x+3)=30$

e $-3(a-4)=24$

f $5(2x+3)=45$

g $5(a+4)=4(a-3)$

h $6(x-7)=5(x-2)$

i $8(x-3)=7(x+1)$

QUESTION **3** Solve the following equations.

a $4(x+5)+x+15=0$

b $6(x-3)=4(x+2)$

c $3(4a-2)=5(4a-2)$

d $4(a+3)=5(2+a)$

e $\frac{2a}{3}+7=15$

f $\frac{2a+5}{3}=9$

g $5(m-1)=4(m+3)$

h $7(t+2)=5(t+3)$

i $4(a+1)+a+5=19$

UNIT 8: Common factors

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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 $-6x - 6xy - 12 =$ _____

UNIT 10: Multiplication and division of algebraic fractions

QUESTION 1 Find the products of these algebraic fractions.

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

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

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

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

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

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

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

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

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

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

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

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

QUESTION 2 Divide the following algebraic fractions.

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

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

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

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

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

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

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

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

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

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

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

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

UNIT 9: Addition and subtraction of algebraic fractions

QUESTION **1** Find the sum of these algebraic fractions.

a $\frac{x}{8}+\frac{x}{8}=$ _____ **b** $\frac{3x}{5}+\frac{2x}{5}=$ _____ **c** $\frac{9x}{15}+\frac{8x}{15}=$ _____

d $\frac{a}{9}+\frac{a}{9}=$ _____ **e** $\frac{x}{7}+\frac{x}{7}=$ _____ **f** $\frac{y}{6}+\frac{y}{6}=$ _____

g $\frac{x}{3}+\frac{x}{4}=$ _____ **h** $\frac{a}{9}+\frac{2a}{7}=$ _____ **i** $\frac{3a}{7}+\frac{a}{2}=$ _____

j $\frac{3x}{5}+\frac{5x}{7}=$ _____ **k** $\frac{2m}{3}+\frac{5m}{9}=$ _____ **l** $\frac{2a}{5}+\frac{3a}{7}=$ _____

QUESTION **2** Subtract the following algebraic fractions.

a $\frac{2a}{3}-\frac{a}{3}=$ _____ **b** $\frac{5x}{7}-\frac{3x}{7}=$ _____ **c** $\frac{15y}{11}-\frac{5y}{11}=$ _____

d $\frac{6m}{13}-\frac{2m}{13}=$ _____ **e** $\frac{5p}{24}-\frac{p}{8}=$ _____ **f** $\frac{8x}{15}-\frac{3x}{15}=$ _____

g $\frac{x}{3}-\frac{x}{7}=$ _____ **h** $\frac{x}{8}-\frac{x}{12}=$ _____ **i** $\frac{y}{12}-\frac{y}{18}=$ _____

j $\frac{3x}{20}-\frac{x}{10}=$ _____ **k** $\frac{2a+1}{7}-\frac{a}{14}=$ _____ **l** $\frac{5x+1}{4}-\frac{x}{12}=$ _____

Substitution

following expressions if a = 2, b = 5 and c = 9.

8). 4 + c
9). b - 3
10). 12 - a
11). b - 4
12). c + 10
13). a + 11
14). 13 - a
15). 14 - b
16). a + b
17). c - b
18). b + c
19). b - a
20). c - a
21). c + a
22). b + b
23). a + b + c
24). b - a + c
25). c - b + a

Find the value of the following expressions if x = 12, y = 8 and z = 16.

1). 2x
2). 3y
3). 2z
4). 5y
5). 3x
6). 9y
7). 7x
8). 5z
9). 10y
10). 6x

These are trickier

11). 2x + 4
12). 3y - 4
13). 2z + 9
14). 40 - 4y
15). 35 - 2z

UNIT 7: Substitution

Pages 32–33

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

a $mn =$ _____

b $mnp =$ _____

c $mn \div p =$ _____

d $m^2n^2 =$ _____

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 $mn^2p - mn =$ _____

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 $\frac{xy}{z} =$ _____

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 $3abc \div d =$ _____

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UNIT 8: Equations arising from substitution in formulae

QUESTION 1 For the formula $A = \frac{1}{2}bh$, find h if:

a $A = 40, b = 8$ _____ **b** $A = 35, b = 10$ _____ **c** $A = 18, b = 6$ _____

d $A = 36, b = 12$ _____ **e** $A = 32, b = 8$ _____ **f** $A = 14, b = 4$ _____

g $A = 24, b = 8$ _____ **h** $A = 27, b = 6$ _____ **i** $A = 20, b = 5$ _____

QUESTION 2 For the formula $A = \frac{1}{2}h(a + b)$, find h if:

a $a = 3, b = 5, A = 20$ _____ **b** $a = 3, b = 7, A = 15$ _____ **c** $a = 2, b = 8, A = 35$ _____

d $a = 4, b = 6, A = 30$ _____ **e** $a = 5, b = 7, A = 24$ _____ **f** $a = 9, b = 11, A = 50$ _____

g $a = 5, b = 9, A = 42$ _____ **h** $a = 4, b = 8, A = 54$ _____ **i** $a = 5, b = 7, A = 30$ _____

QUESTION 3 For the formula $C = 2\pi r$, find r in terms of π if:

a $C = 14$ _____ **b** $C = 42$ _____ **c** $C = 78$ _____

d $C = 26$ _____ **e** $C = 54$ _____ **f** $C = 90$ _____

g $C = 38$ _____ **h** $C = 66$ _____ **i** $C = 94$ _____

QUESTION 4 For the formula $A = \pi r^2$, find r in terms of π if:

a $A = 10$ _____ **b** $A = 28$ _____ **c** $A = 57$ _____

d $A = 15$ _____ **e** $A = 32$ _____ **f** $A = 63$ _____

g $A = 20$ _____ **h** $A = 46$ _____ **i** $A = 72$ _____

QUESTION 5 For the formula $P = 2L + 2B$, find L if:

a $P = 50, B = 8$ _____ **b** $P = 60, B = 10$ _____ **c** $P = 48, B = 6$ _____

d $P = 80, B = 12$ _____ **e** $P = 72, B = 6$ _____ **f** $P = 108, B = 24$ _____

CHAPTER 6
Equations and formulae

Pages 99–100

UNIT 1: One-step equations (addition and subtraction)

QUESTION 1 Solve the following equations.

a $x + 3 = 11$

b $a + 9 = 25$

c $y - 5 = 16$

d $b + 7 = 17$

e $m + 3 = 23$

f $n - 9 = 21$

g $k + 1 = 36$

h $y + 3 = 22$

i $t - 5 = 17$

QUESTION 2 Solve the following one-step equations.

a $p - 3 = 15$

b $x - 5 = 18$

c $m - 6 = 31$

d $n - 1 = 5$

e $t - 4 = -7$

f $a - 3 = -8$

g $y + 7 = 9$

h $x - 3 = 28$

i $7 + a = 24$

j $x + 5 = 19$

k $a - 3 = 58$

l $m - 1 = -10$

QUESTION 3 Solve these equations.

a $a + 7 = 12$

b $n + 6 = 8$

c $x + 3 = 38$

d $b + 5 = 15$

e $p - 8 = 7$

f $a + 5 = 27$

g $m - 9 = 18$

h $t - 2 = 23$

i $y - 6 = 28$

j $x - 7 = 31$

k $a - 7 = 25$

l $12 + x = 41$

Pages 99–100

UNIT 2: One-step equations (multiplication and division)

QUESTION **1** Solve the following one-step equations.

a $5a = 35$

b $\frac{x}{7} = 3$

c $8y = 56$

d $\frac{a}{3} = 8$

e $\frac{y}{5} = 9$

f $9x = -45$

g $6m = 54$

h $\frac{t}{6} = -7$

i $8t = 72$

QUESTION **2** Solve the following equations.

a $\frac{x}{5} = 8$

b $7x = -49$

c $8x = 88$

d $4x = 48$

e $\frac{a}{9} = -3$

f $\frac{d}{5} = -5$

g $9x = -36$

h $\frac{a}{7} = 9$

i $11x = 121$

QUESTION **3** Solve these equations.

a $3a = 21$

b $-7x = -49$

c $\frac{p}{-9} = 8$

d $\frac{y}{3} = -6$

e $\frac{m}{6} = -4$

f $7x = -42$

g $5b = -125$

h $-2x = -18$

i $\frac{t}{-2} = 12$

j $\frac{y}{7} = 12$

k $\frac{n}{8} = 4$

l $-6x = 54$

Solve these equations.

REMEMBER…..

Do the opposite of the sign.

1. $m - 9 = 16$

2. $d + 8 = 11$

3. $8z = 64$

4. $\frac{x}{5} = 9$

5. $h - 17 = 34$

6. $6t = 396$

7. $g + 542 = 839$

8. $\frac{e}{6} = 4$

9. $9e = 729$

10. $56 + r = 81$

11. $\frac{v}{84} = 5$

12. $z + 678 = 876$

13. $\frac{h}{15} = 15$

14. $q - 73 = 72$

15. $23s = 161$

16. $w - 976 = 1025$

17. $p + 45 = 63$

18. $\frac{m}{16} = 90$

19. $b - 893 = 467$

20. $r - 81 = 119$

21. $84 + h = 192$

22. $x - 87 = 47$

23. $d + 113 = 824$

24. $\frac{u}{15} = 2$

25. $2q = 62$

26. $\frac{p}{6} = 35$

27. $28 + s = 119$

28. $z - 58 = 91$

29. $\frac{c}{7} = 13$

30. $6c = 54$

UNIT 3: Two-step equations

Pages 100–101

QUESTION 1 Solve the following two-step equations.

a $2x + 3 = 7$ _____

b $3x - 5 = 4$ _____

c $5y - 10 = 5$ _____

d $\frac{6m}{5} = 12$ _____

e $\frac{x-2}{5} = 2$ _____

f $19 = 3a - 8$ _____

g $\frac{a}{2} - 2 = 8$ _____

h $4x - 5 = 19$ _____

i $\frac{x-5}{7} = 6$ _____

QUESTION 2 Solve the following equations.

a $2x + 7 = 31$ _____

b $6y - 4 = 26$ _____

c $3k + 1 = 22$ _____

d $\frac{a}{5} - 4 = 8$ _____

e $7p - 6 = 29$ _____

f $\frac{x}{3} - 3 = 11$ _____

g $5a - 3.6 = 7$ _____

h $8a - 2\frac{1}{2} = 5\frac{1}{2}$ _____

i $7b + 0.4 = 6.7$ _____

QUESTION 3 Solve these equations.

a $5x - 5 = 20$ _____

b $\frac{x}{4} + 9 = 13$ _____

c $\frac{x-2}{5} = 7$ _____

d $3y + 6 = 24$ _____

e $8y + 4 = -4$ _____

f $7y - 6 = 22$ _____

g $3t - 1 = 8$ _____

h $\frac{m-2}{4} = 6$ _____

i $3x - 3 = 24$ _____

j $2y + 9 = -3$ _____

k $3p + 7 = -14$ _____

l $2x - 5 = 11$ _____

UNIT 6: Equations with fractions

QUESTION **1** Solve the following equations.

a $\frac{x}{3}=\frac{1}{2}$ _____

b $\frac{a}{5}=\frac{1}{3}$ _____

c $\frac{3y}{5}=1\frac{1}{2}$ _____

d $\frac{a}{2}+\frac{a}{3}=15$ _____

e $\frac{m}{3}+\frac{m}{5}=8$ _____

f $\frac{x}{3}-\frac{x}{4}=7$ _____

g $\frac{a+7}{5}=3$ _____

h $\frac{4x}{5}=12$ _____

i $\frac{3x-4}{5}=7$ _____

QUESTION **2** Solve these equations.

a $\frac{m+5}{4}=8$ _____

b $\frac{m+2}{3}=7$ _____

c $\frac{2x}{7}=9$ _____

d $\frac{3m-4}{4}=20$ _____

e $\frac{m-5}{4}=6$ _____

f $\frac{3a-7}{4}=6$ _____

g $\frac{3p-9}{4}=6$ _____

h $\frac{3p-7}{2}=4$ _____

i $\frac{5x-4}{3}=12$ _____

QUESTION **3** Solve the following equations.

a $\frac{3x+2}{4}=8$ _____

b $\frac{2x}{3}+\frac{x}{6}=10$ _____

c $\frac{6p-5}{2}=8$ _____

d $\frac{a}{4}-\frac{a}{6}=8$ _____

e $\frac{8p}{15}-3=7$ _____

f $\frac{5a-2}{3}=6$ _____

g $\frac{m}{2}+\frac{m}{6}=3$ _____

h $\frac{8p}{15}+3=7$ _____

i $\frac{8a}{3}+1=9$ _____

j $\frac{a-5}{3}=4$ _____

k $\frac{k+2}{5}=6$ _____

l $\frac{m}{6}+4=21$ _____

7 Solve each of the following equations:

a $\frac{x}{2}+1=3$ **b** $\frac{a}{5}-1=4$ **c** $4+\frac{a}{2}=6$

d $\frac{d}{4}-1=9$ **e** $\frac{s}{9}+9=9$ **f** $\frac{a}{3}-6=5$

g $\frac{w}{5}-2=3$ **h** $\frac{q}{7}+9=10$ **i** $\frac{r}{10}+5=10$

j $\frac{x}{4}-3=3$ **k** $\frac{x}{4}+3=3$ **l** $\frac{2x}{3}-1=5$

8 Isolate the pronumeral in each of the following equations:

a $\frac{a+1}{7}=2$ **b** $\frac{a-1}{7}=2$ **c** $\frac{x+5}{2}=3$

d $\frac{n-4}{2}=4$ **e** $\frac{w-8}{3}=^{-}2$ **f** $\frac{5-w}{2}=6$

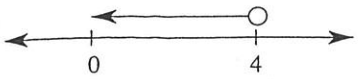
g $\frac{4+2x}{3}=4$ **h** $\frac{3x-1}{2}=2$ **i** $\frac{2a-6}{3}=4$

j $\frac{2-a}{3}=^{-}4$ **k** $\frac{3p+4}{5}=5$ **l** $\frac{5y-2}{3}=^{-}2$

UNIT 12: Inequalities

QUESTION **1.** State the inequality that is graphed on each number line.

a



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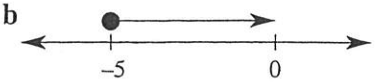

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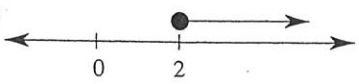

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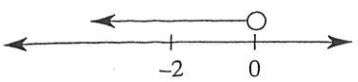

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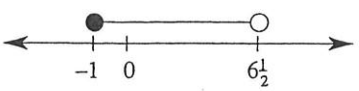

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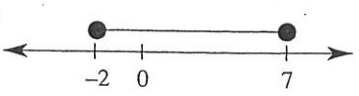

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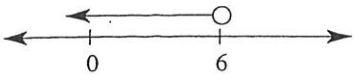

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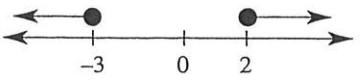

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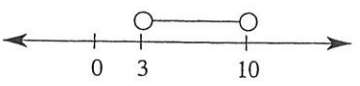


QUESTION **2** Graph each inequality on the number line provided.

a $x \geqslant 3$

b $x < 0$

c $x < 2$ or $x > 4$

d $x \leqslant 5$

e $x > -1$

f $x < -5$

g $-3 < x < 8$

h $x \leqslant 2$ or $x \geqslant 6$

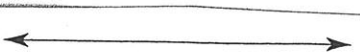
i $1 \leqslant x < 4$

QUESTION **3** Solve each inequality and graph the solution on the number line provided.

a $x + 2 < 5$ _____

b $a - 3 > 4$ _____

c $y + 2 > 6$ _____



d $4 + y \leqslant 12$ _____

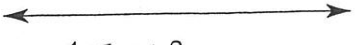
e $18 > 8 + x$ _____

f $n - 5 > 6$ _____

g $x - 2 > 1$ _____

h $m - 4 \leqslant 7$ _____

i $12 \geqslant x - 8$ _____



j $m - 3 \leqslant 9$ _____

k $-10 \geqslant x - 7$ _____

l $-4 \leqslant a + 2$ _____

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UNIT 13: Inequalities

QUESTION **1** Solve the following inequalities and graph the solutions on the number lines provided.

a $x + 1 < 3$

b $m + 5 > 7$

c $t - 3 < 1$

d $p + 5 \geq 2$

e $y - 2 \leq 1$

f $x + 4 \geq 6$

g $3x < 12$

h $4p \geq 8$

i $6m < 12$

j $\frac{x}{3} \geq 1$

k $\frac{x}{2} < 3$

l $\frac{x}{4} \leq 2$

QUESTION **2** Solve the following inequalities.

a $6x < 24$

b $5x - 2 < 18$

c $3x - 1 \leq 5$

d $3x - 2 \geq -5$

e $4x - 7 \leq 9$

f $3t + 1 \geq 7$

g $6y - 7 < 5$

h $3(x + 2) \geq 12$

i $4(x - 3) \leq -16$

j $2(3x - 1) \geq 28$

k $8x < 5x + 15$

l $7x - 5 \leq 9$

m $\frac{x}{3} - 1 < 1$

n $\frac{y - 1}{2} > 2$

o $\frac{m}{3} + \frac{m}{2} \leq 1$

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