

**IFIELD COMMUNITY COLLEGE**

**MATHEMATICS DEPARTMENT**

**Introduction to A Level Maths**

**INDUCTION BOOKLET**

**A level Mathematics**

Congratulations on choosing to study Mathematics in the sixth form at Ifield Community College.

The Mathematics Department is committed to ensuring that you make good progress throughout your A level or AS course. Algebra is a key skill in A level maths, to have the best possible start to the course, we have prepared a booklet of key GCSE topics you need to master before September.

**The Task**

Work through the questions in this booklet over the summer - you will need to have a good knowledge of these topics before you commence your course in September.

You should have met all the topics before at GCSE and if you get stuck, you may find that the clips in the links on page 4 help.

Work through the introduction to each chapter, making sure that you understand the examples. Highlight the key points and mark anything you don’t understand.

Then tackle the exercise – not necessarily every question, but enough to ensure you understand the topic thoroughly. The answers are given at the back of the booklet. You should mark your work and correct it where necessary.

We will test you early in the course to check how well you understand these topics, so it is important that you have completed the booklet before then and filled in the self-assessment page. A practice test is provided at the back of the booklet.

We look forward to working with you as KS 5 mathematicians!

**Course Description**

Course Title: **Mathematics**

Examination Board: **Edexcel (Pearson)**

**Assessment structure at a glance**



A Level Papers

Exams at the end of Year 13

AS Level Papers

Exams at the end of Year 12

**Extra support**

You may also find the following books useful:

**Bridging GCSE & A Level Maths by Mark Rowland**

Published by Collins

ISBN: 978 0 00741 023 1

Cost: £17.99 (Amazon)

**AS-Level Maths Head Start**

Published by CGP Workbooks

ISBN: 978 1 84146 993 5

Cost: £5.77 (Amazon)

The excellent website <https://www.mathsgenie.co.uk/gcse.html> has tutorial clips for the entire course, as well as a selection of GCSE topics

The AMSP (Advanced Mathematics Support Programme) also contains a host of great resources.

<https://amsp.org.uk/teachers/11-16-maths/transition-to-level-3-maths/essential-skills>

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As you work through this booklet you should make a note on this checklist of where you needed help. If you are still unsure about a topic, tick the final column.

Please do not just pretend you are ok with these topics if you are struggling! We are here to help! We will put on extra sessions to help you sort out these problems early on in the course.

**EXERCISE CHECK LIST**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TOPIC | Exercise | I was fine on this exercise | I got help on this exercise and now it’s ok | I still have a problem with this topic |
| Removing brackets | A  B (DOTs) |  |  |  |
| Linear equations | A  B (brackets)  C (fractions) |  |  |  |
| Simultaneous equations | A |  |  |  |
| Factorising | A  B (quadratics) |  |  |  |
| Change the subject of the formula | A  B  C |  |  |  |
| Solving quadratic equations | A |  |  |  |
| Indices | A  B (fractional and negative) |  |  |  |
| Completing the Square | A |  |  |  |
| Practice Test |  |  |  |  |

# Chapter 1: REMOVING BRACKETS

To remove a single bracket, we multiply every term in the bracket by the number or the expression on the outside:

**Examples**

1) 3 (*x* + 2*y*) = 3*x* + 6*y*

2) -2(2*x* - 3) = (-2)(2*x*) + (-2)(-3)

= -4*x* + 6

To expand two brackets, we must multiply everything in the first bracket by everything in the second bracket. We can do this in a variety of ways, including

\* the smiley face method

\* FOIL (Fronts Outers Inners Lasts)

\* using a grid.

**Examples**:

1) (*x* + 1)(*x* + 2) = *x*(*x* + 2) + 1(*x* + 2)

or

(*x* +1)(*x* + 2) = *x*2 + 2 + 2*x* + *x*  = *x*2 + 3*x* +2

or

|  |  |  |
| --- | --- | --- |
|  | *x* | 1  (*x* +1)(*x* + 2) = *x*2 + 2*x* + *x* + 2 = *x*2 + 3*x* +2 |
| *x* | *x*2 | *x* |
| 2 | 2*x* | 2 |

2) (*x* - 2)(2*x* + 3) = *x*(2*x* + 3) - 2(2*x* +3) = 2*x*2 + 3*x* – 4*x* - 6

= 2*x*2 – *x* – 6

or

(*x* - 2)(2*x* + 3) = 2*x*2 – 6 + 3*x* – 4*x* = 2*x*2 – *x* – 6

or

(2*x* +3)(*x* - 2) = 2*x*2 + 3*x* - 4*x* - 6 = 2*x*2 - *x* - 6

|  |  |  |
| --- | --- | --- |
|  | *x* | -2 |
| 2*x* | 2*x*2 | -4*x* |
| 3 | 3*x* | -6 |

**EXERCISE A** Multiply out the following brackets and simplify.

1. 7(4*x* + 5)
2. -3(5*x* - 7)
3. 5*a* – 4(3*a* - 1)
4. 4*y* + *y*(2 + 3*y*)
5. -3*x* – (*x* + 4)
6. 5(2*x* - 1) – (3*x* - 4)
7. (*x* + 2)(*x* + 3)
8. (*t* - 5)(*t* - 2)
9. (2*x* + 3*y*)(3*x* – 4*y*)
10. 4(*x* - 2)(*x* + 3)
11. (2*y* - 1)(2*y* + 1)
12. (3 + 5*x*)(4 – *x*)

**Two Special Cases**

**Perfect Square: Difference of two squares:**

(*x* + *a*)2  = (*x + a*)(*x + a*)= *x*2 + 2*ax* + *a*2 (*x - a*)(*x + a*) = *x*2 – *a*2

(2*x* - 3)2  = (2*x* – 3)(2*x* – 3) = 4*x*2 – 12*x* + 9 (*x* - 3)(*x* + 3) = *x*2 – 32

= *x*2 – 9

**EXERCISE B** Multiply out

1. (*x* - 1)2

2. (3*x* + 5)2

3. (7*x* - 2)2

4. (*x* + 2)(*x* - 2)

5. (3*x* + 1)(3*x* - 1)

6. (5*y* - 3)(5*y* + 3)

# Chapter 2: LINEAR EQUATIONS

When solving an equation, you must remember that whatever you do to one side must also be done to the other. You are therefore allowed to

* add the same amount to both side
* subtract the same amount from each side
* multiply the whole of each side by the same amount
* divide the whole of each side by the same amount.

If the equation has unknowns on both sides, you should collect all the letters onto the same side of the equation.

If the equation contains brackets, you should start by expanding the brackets.

A linear equation is an equation that contains numbers and terms in *x*. A linear equation does not contain any  terms.

**More help** on solving equations can be obtained by downloading the leaflet available at this website: <http://www.mathcentre.ac.uk/resources/workbooks/mathcentre/web-simplelinear.pdf>

**Example 1**: Solve the equation 64 – 3*x* = 25

**Solution**: There are various ways to solve this equation. One approach is as follows:

Step 1: Add 3*x* to both sides (so that the *x* term is positive): 64 = 3*x* + 25

Step 2: Subtract 25 from both sides: 39 = 3*x*

Step 3: Divide both sides by 3: 13 = *x*

So the solution is *x* = 13.

**Example 2**: Solve the equation 6*x* + 7 = 5 – 2*x*.

**Solution:**

Step 1: Begin by adding 2*x* to both sides 8*x* + 7 = 5

(to ensure that the *x* terms are together on the same side)

Step 2: Subtract 7 from each side: 8*x* = -2

Step 3: Divide each side by 8: *x* = -¼

**Exercise A**: Solve the following equations, showing each step in your working:

1) 2*x* + 5 = 19 2) 5*x* – 2 = 13 3) 11 – 4*x* = 5

4) 5 – 7*x* = -9 5) 11 + 3*x* = 8 – 2*x* 6) 7*x* + 2 = 4*x* – 5

**Example 3**: Solve the equation 2(3*x* – 2) = 20 – 3(*x* + 2)

Step 1: Multiply out the brackets: 6*x* – 4 = 20 – 3*x* – 6

(taking care of the negative signs)

Step 2: Simplify the right hand side: 6*x* – 4 = 14 – 3*x*

Step 3: Add 3x to each side: 9*x* – 4 = 14

Step 4: Add 4: 9*x* = 18

Step 5: Divide by 9: *x* = 2

**Exercise B:** Solve the following equations.

1) 5(2*x* – 4) = 4 2) 4(2 – *x*) = 3(*x* – 9)

3) 8 – (*x* + 3) = 4 4) 14 – 3(2*x* + 3) = 2

**EQUATIONS CONTAINING FRACTIONS**

When an equation contains a fraction, the first step is usually to multiply through by the denominator of the fraction. This ensures that there are no fractions in the equation.

**Example 4**: Solve the equation 

**Solution**:

Step 1: Multiply through by 2 (the denominator in the fraction): 

Step 2: Subtract 10: *y* = 12

**Example 5**: Solve the equation 

**Solution**:

Step 1: Multiply by 3 (to remove the fraction) 

Step 2: Subtract 1 from each side 2*x* = 14

Step 3: Divide by 2 *x* = 7

When an equation contains two fractions, you need to multiply by the lowest common denominator.

This will then remove both fractions.

**Example 6**: Solve the equation 

**Solution**:

Step 1: Find the lowest common denominator: The smallest number that both 4 and 5 divide into is 20.

Step 2: Multiply both sides by the lowest common denominator 

Step 3: Simplify the left hand side: 

5(*x* + 1) + 4(*x* + 2) = 40

Step 4: Multiply out the brackets: 5*x* + 5 + 4*x* + 8 = 40

Step 5: Simplify the equation: 9*x* + 13 = 40

Step 6: Subtract 13 9*x* = 27

Step 7: Divide by 9: *x* = 3

**Example 7**: Solve the equation 

**Solution**: The lowest number that 4 and 6 go into is 12. So we multiply every term by 12:



Simplify 

Expand brackets 

Simplify 

Subtract 10*x* 

Add 6 5*x* = 24

Divide by 5 *x* = 4.8

**Exercise C**: Solve these equations

1)  2) 

3)  4) 

**Exercise C (continued)**

5)  6) 

7)  8) 

# Chapter 3: SIMULTANEOUS EQUATIONS

An example of a pair of simultaneous equations is 3*x* + 2*y* = 8 ➀

5*x* + *y* = 11 ➁

In these equations, *x* and *y* stand for two numbers. We can solve these equations in order to find the values of *x* and *y* by eliminating one of the letters from the equations.

In these equations it is simplest to eliminate *y*. We do this by making the coefficients of *y* the same in both equations. This can be achieved by multiplying equation ➁ by 2, so that both equations contain 2*y*:

3*x* + 2*y* = 8 ➀

10*x* + 2*y* = 22 2×➁ = ➂

To eliminate the *y* terms, we subtract equation ➂ from equation ➀. We get: 7*x* = 14

i.e. *x* = 2

To find y, we substitute *x* = 2 into one of the original equations. For example if we put it into ➁:

10 + *y* = 11

*y* = 1

Therefore the solution is *x* = 2, *y* = 1.

**Remember**: You can check your solutions by substituting both x and y into the original equations.

**Example**: Solve 2*x* + 5*y* = 16 ➀

3*x* – 4*y* = 1 ➁

**Solution**: We begin by getting the same number of *x* or *y* appearing in both equation. We can get 20*y* in both equations if we multiply the top equation by 4 and the bottom equation by 5:

8*x* + 20*y* = 64 ➂

15*x* – 20*y* = 5 ➃

As the signs in front of 20*y* are different, we can eliminate the *y* terms from the equations by ADDING:

23*x* = 69 ➂+➃

i.e. *x* = 3

Substituting this into equation ➀ gives:

6 + 5*y* = 16

5*y* = 10

So… *y* = 2

The solution is *x* = 3, *y* = 2.

**Exercise A**:

Solve the pairs of simultaneous equations in the following questions:

1) *x* + 2*y* = 7 2) *x* + 3*y* = 0

3*x* + 2*y* = 9 3*x* + 2*y* = -7

3) 3*x* – 2*y* = 4 4) 9*x* – 2*y* = 25

2*x* + 3*y* = -6 4*x* – 5*y* = 7

5) 4*a* + 3*b* = 22 6) 3*p* + 3*q* = 15

5*a* – 4*b* = 43 2*p* + 5*q* = 14

# Chapter 4: FACTORISING

**Common factors**

We can factorise some expressions by taking out a common factor.

**Example 1**: Factorise 12*x* – 30

**Solution**: 6 is a common factor to both 12 and 30. We can therefore factorise by taking 6 outside a bracket:

12*x* – 30 = 6(2*x* – 5)

**Example 2**: Factorise 6*x*2 – 2*xy*

**Solution**: 2 is a common factor to both 6 and 2. Both terms also contain an *x*.

So we factorise by taking 2*x* outside a bracket.

6*x*2 – 2*xy* = 2*x*(3*x* – *y*)

**Example 3**: Factorise 9*x*3*y*2 – 18*x*2*y*

**Solution**: 9 is a common factor to both 9 and 18.

The highest power of *x* that is present in both expressions is *x*2.

There is also a *y* present in both parts.

So we factorise by taking 9*x*2*y* outside a bracket:

9*x*3*y*2 – 18*x*2*y* = 9*x*2*y*(*xy* – 2)

**Example 4**: Factorise 3*x*(2*x* – 1) – 4(2*x* – 1)

**Solution**: There is a common bracket as a factor.

So we factorise by taking (2*x* – 1) out as a factor.

The expression factorises to (2*x* – 1)(3*x* – 4)

**Exercise A**

Factorise each of the following

1) 3*x* + *xy*

2) 4*x*2 – 2*xy*

3) *pq*2 – *p*2*q*

4) 3*pq* - 9*q*2

5) 2*x*3 – 6*x*2

6) 8*a*5*b*2 – 12*a*3*b*4

7) 5*y*(*y* – 1) + 3(*y* – 1)

**Factorising quadratics**

**Simple quadratics: Factorising quadratics of the form **

The method is:

Step 1: Form two brackets (*x* … )(*x* … )

Step 2: Find two numbers that multiply to give *c* and add to make *b*. These two numbers get written at the other end of the brackets.

**Example 1**: Factorise *x*2 – 9*x* – 10.

**Solution**: We need to find two numbers that multiply to make -10 and add to make -9. These numbers are -10 and 1.

Therefore *x*2 – 9*x* – 10 = (*x* – 10)(*x* + 1).

**General quadratics: Factorising quadratics of the form **

The method is:

Step 1: Find two numbers that multiply together to make *ac* and add to make *b*.

Step 2: Split up the *bx* term using the numbers found in step 1.

Step 3: Factorise the front and back pair of expressions as fully as possible.

Step 4: There should be a common bracket. Take this out as a common factor.

**Example 2**: Factorise 6*x*2 + *x* – 12.

**Solution**: We need to find two numbers that multiply to make 6 × -12 = -72 and add to make 1. These two numbers are -8 and 9.

Therefore, 6*x*2 + *x* – 12 = 6*x*2 - 8*x* + 9*x* – 12

= 2*x*(3*x* – 4) + 3(3*x* – 4) (the two brackets must be identical)

= (3*x* – 4)(2*x* + 3)

**Difference of two squares: Factorising quadratics of the form **

Remember that  = (*x + a*)(*x – a*).

Therefore: 



Also notice that: 

and 

**Factorising by pairing**

We can factorise expressions like  using the method of factorising by pairing:

 = *x*(2*x* + *y*) – 1(2*x* + *y*) (factorise front and back pairs, ensuring both brackets are identical)

= (2*x* + *y*)(*x* – 1)

**Exercise B**

Factorise

1) 

2) 

3) 

4)  (factorise by taking out a common factor)

5) 

6) 

7) 

8) 

9) 

10) 

11) 

12) 

13) 

14) 

# Chapter 5: CHANGING THE SUBJECT OF A FORMULA

We can use algebra to change the subject of a formula. Rearranging a formula is similar to solving an equation – we must do the same to both sides in order to keep the equation balanced.

**Example 1**: Make *x* the subject of the formula *y* = 4*x* + 3.

**Solution**: *y* = 4*x* + 3

Subtract 3 from both sides: *y* – 3 = 4*x*

Divide both sides by 4; 

So  is the same equation but with *x* the subject.

**Example 2**: Make *x* the subject of *y* = 2 – 5*x*

**Solution**: Notice that in this formula the *x* term is negative.

*y* = 2 – 5*x*

Add 5*x* to both sides *y* + 5*x* = 2 (the *x* term is now positive)

Subtract *y* from both sides 5*x* = 2 – *y*

Divide both sides by 5 

**Example 3**: The formula  is used to convert between ° Fahrenheit and ° Celsius.

We can rearrange to make *F* the subject.



Multiply by 9  (this removes the fraction)

Expand the brackets 

Add 160 to both sides 

Divide both sides by 5 

Therefore the required rearrangement is .

**Exercise A**

Make *x* the subject of each of these formulae:

1) *y* = 7*x* – 1 2) 

3)  4) 

**Rearranging equations involving squares and square roots**

**Example 4**: Make *x* the subject of 

**Solution**: 

Subtract  from both sides:  (this isolates the term involving *x*)

Square root both sides: 

Remember that you can have a positive or a negative square root. We cannot simplify the answer any more.

**Example 5**: Make *a* the subject of the formula 

**Solution**: 

Multiply by 4 

Square both sides 

Multiply by *h*: 

Divide by 5: 

**Exercise B:**

Make *t* the subject of each of the following

1)  2) 

3)  4) 

5)  6) 

**More difficult examples**

Sometimes the variable that we wish to make the subject occurs in more than one place in the formula. In these questions, we collect the terms involving this variable on one side of the equation, and we put the other terms on the opposite side.

**Example 6**: Make *t* the subject of the formula 

**Solution**: 

Start by collecting all the t terms on the right hand side:

Add *xt* to both sides: 

Now put the terms without a *t* on the left hand side:

Subtract *b* from both sides: 

Factorise the RHS: 

Divide by (*y + x*): 

So the required equation is 

**Example 7**: Make *W* the subject of the formula 

**Solution**: This formula is complicated by the fractional term. We begin by removing the fraction:

Multiply by 2*b*: 

Add 2*bW* to both sides:  (this collects the W’s together)

Factorise the RHS: 

Divide both sides by *a* + 2*b*: 

**Exercise C**

Make *x* the subject of these formulae:

1)  2) 

3)  4) 

# Chapter 6: SOLVING QUADRATIC EQUATIONS

A quadratic equation has the form .

There are two methods that are commonly used for solving quadratic equations:

\* factorising

\* the quadratic formula

Note that not all quadratic equations can be solved by factorising. The quadratic formula can always be used however.

**Method 1: Factorising**

Make sure that the equation is rearranged so that the right hand side is 0. It usually makes it easier if the coefficient of *x*2 is positive.

**Example 1** : Solve *x*2 –3*x* + 2 = 0

Factorise (*x* –1)(*x* – 2) = 0

Either (*x* – 1) = 0 or (*x* – 2) = 0

So the solutions are *x* = 1 or *x* = 2

Note: The individual values *x* = 1 and *x* = 2 are called the **roots** of the equation.

**Example 2**: Solve *x*2 – 2*x* = 0

Factorise: *x*(*x* – 2) = 0

Either *x* = 0 or (*x* – 2) = 0

So  *x* = 0 or *x* = 2

**Method 2: Using the formula**

Recall that the roots of the quadratic equation  are given by the formula:



**Example 3**: Solve the equation 

**Solution**: First we rearrange so that the right hand side is 0. We get 

We can then tell that *a* = 2, *b* = 3 and *c* = -12.

Substituting these into the quadratic formula gives:

 (this is the *surd form* for the solutions)

If we have a calculator, we can evaluate these roots to get: *x* = 1.81 or *x* = -3.31

**EXERCISE A**

1) Use factorisation to solve the following equations:

a) *x*2 + 3*x* + 2 = 0 b) *x*2 – 3*x* – 4 = 0

c) *x*2  = 15 – 2*x*

2) Find the roots of the following equations:

a) *x*2 + 3*x* = 0 b) *x*2 – 4*x* = 0

c) 4 *– x*2 = 0

3) Solve the following equations either by factorising or by using the formula:

a) 6*x*2  - 5*x* – 4 = 0 b) 8*x*2 – 24*x* + 10 = 0

4) Use the formula to solve the following equations to 3 significant figures. Some of the equations can’t be solved.

a) *x*2 +7*x* +9 = 0 b) 6 + 3*x* = 8*x*2

c) 4*x*2 – *x* – 7 = 0 d) *x*2 – 3*x* + 18 = 0

e) 3*x*2 + 4*x* + 4 = 0 f) 3*x*2 = 13*x* – 16

**Chapter 7: INDICES**

**Basic rules of indices**

. 4 is called the **index** (plural: indices), **power** or **exponent** of *y*.

There are 3 basic rules of indices:

1)  e.g. 

2)  e.g. 

3)  e.g. 

**Further examples**



 (multiply the numbers and multiply the *a*’s)

 (multiply the numbers and multiply the *c*’s)

 (divide the numbers and divide the *d* terms i.e. by subtracting the powers)

**Exercise A**

Simplify the following:

1)  = (Remember that )

2)  =

3)  =

4) =

5)  =

6)  =

7)  =

8)  =

**More complex powers**

**Zero index:**

Recall from GCSE that

.

This result is true for any non-zero number *a*.

Therefore 

**Negative powers**

A power of -1 corresponds to the reciprocal of a number, i.e. 

Therefore 



 (you find the reciprocal of a fraction by swapping the top and bottom over)

This result can be extended to more general negative powers: .

This means:







**Fractional powers:**

Fractional powers correspond to roots: 

In general:



Therefore:

  

A more general fractional power can be dealt with in the following way: 

So 





**Exercise B:**

Find the value of:

1) 

2) 

3) 

4) 

5) 

6) 

7) 

8) 

9) 

10) 

11) 

12) 

Simplify each of the following:

13) 

14) 

15) 

**Chapter 8: COMPLETING THE SQUARE**

Formula for C.T.S:



Completing the square is used to write out a quadratic equation:





To complete the square of the function  you need a further term .

So the completed square form is



Similarly



**Example 1**:

Complete the square for the expression 



=

=

**Example 2**:

Complete the square for expressions

1.  b) 

=  = 

=  = 

= 

**Exercise A:**

Complete the square for the expressions:

1.  2.  3.  4. 

5.  6.  7.  8. 

9.  10.  11.  12. 

**Practice Booklet Test**

This is a sample test that Year 12 mathematicians recently sat as part of their baseline assessment.

Your test will ask similar questions to this one and will cover some additional AS content that will be new to you. If you can achieve a high score in this self assessment then you are well on your way to starting a good career in A level maths.

**You may NOT use a calculator**

If *ax*2 + *bx* + *c* = 0 then *x* **= **

1. Expand and simplify

(a) (2*x* + 3)(2*x* – 1) (b) (*a* + 3)2 (c) 4*x*(3*x* – 2) – *x*(2*x* + 5)

2. Factorise

(a) *x*2 – 7*x* (b) *y*2 – 64 (c) 2*x*2 + 5*x* – 3 (d) 6*t*2 – 13*t* + 5

3. Simplify

(a)  (b) + 

4. Solve the following equations

(a) +  = 4 (b) *x*2 – 8*x* = 0 (c) *p*2 + 4*p* = 12

5. Write each of the following as single powers of *x* and / y

(a)  (b) (*x*2*y*)3 (c) 

6. Work out the values of the following, giving your answers as fractions

(a) 4-2 (b) 100 (c) 

7. Solve the simultaneous equations 3*x* – 5y = -11

5*x* – 2y = 7

8. Rearrange the following equations to make *x* the subject

(a) *v*2 = u2 + 2a*x* (b) V = π*x*2h (c) y = 

9. Solve 5*x*2 – *x* – 1 = 0 giving your solutions in surd form

10. If *x*2 + 6*x* + 4 = (*x* + *p*)2 + *q*

Find the values of *p* and *q*

**SOLUTIONS TO THE EXERCISES**

**CHAPTER 1:**

Ex A

1) 28*x* + 35 2) -15*x* + 21 3) -7*a* + 4 4) 6*y* + 3*y*2 5) 2*x* – 4

6) 7*x* – 1 7) *x*2 + 5x + 6 8) *t*2 – 3*t* – 10 9) 6*x*2 + *xy* – 12*y*2

10) 4*x*2 + 4*x* – 24 11) 4*y*2 – 1 12) 12 + 17*x* – 5*x*2

Ex B

1) *x*2 – 2*x* + 1 2) 9*x*2 + 30*x* + 25 3) 49*x*2 – 28*x* + 4 4) *x*2 – 4

5) 9*x*2 -1 6) 25*y*2 – 9

**CHAPTER 2**

Ex A

1) 7 2) 3 3) 1½ 4) 2 5) -3/5 6) -7/3

Ex B

1) 2.4 2) 5 3) 1 4) ½

Ex C

1) 7 2) 15 3) 24/7 4) 35/3 5) 3 6) 2 7) 9/5 8) 5

Ex D

1) 34, 36, 38 2) 9.875, 29.625 3) 24, 48

**CHAPTER 3**

1) *x* = 1, *y* = 3 2) *x* = -3, *y* = 1 3) *x* = 0, *y* = -2 4) *x* = 3, *y* = 1

5) *a* = 7, *b* = -2 6) *p* = 11/3, *q* = 4/3

**CHAPTER 4**

Ex A

1)  *x*(3 + *y*) 2) 2*x*(2*x* – *y*) 3) *pq*(*q* – *p*) 4) 3*q*(*p* – 3*q*) 5) 2*x*2(*x* - 3) 6) 4*a*3*b*2(2*a*2 – 3*b*2)

7) (*y* – 1)(5*y* + 3)

Ex B

1) (*x* – 3)(*x* + 2) 2) (*x* + 8)(*x* – 2) 3) (2*x* + 1)(*x* + 2) 4) *x*(2*x* – 3) 5) (3*x* -1 )(*x* + 2)

6) (2*y* + 3)(*y* + 7) 7) (7*y* – 3)(*y* – 1) 8) 5(2*x* – 3)(*x* + 2) 9) (2*x* + 5)(2*x* – 5) 10) (*x* – 3)(*x* – *y*)

11) 4(*x* – 2)(*x* – 1) 12) (4*m* – 9*n*)(4*m* + 9*n*) 13) *y*(2*y* – 3*a*)(2*y* + 3*a*) 14) 2(4*x* + 5)(*x* – 4)

**CHAPTER 5**

Ex A

1)  2)  3)  4) 

Ex B

1)  2)  3)  4)  5)  6) 

Ex C

1)  2)  3)  4) 

**CHAPTER 6**

1) a) -1, -2 b) -1, 4 c) -5, 3 2) a) 0, -3 b) 0, 4 c) 2, -2

3) a) -1/2, 4/3 b) 0.5, 2.5 4) a) -5.30, -1.70 b) 1.07, -0.699 c) -1.20, 1.45

d) no solutions e) no solutions f) no solutions

**CHAPTER 7**

Ex A

1) 5*b*6 2) 6*c7* 3) *b*3*c*4 4) -12*n*8 5) 4*n*5 6) *d*2 7) *a*6 8) -*d*12

Ex B

1) 2 2) 3 3) 1/3 4) 1/25 5) 1 6) 1/7 7) 9 8) 9/4 9) ¼ 10) 0.2 11) 4/9 12) 64

13) 6*a*3  14)  *x* 15) *xy*2

**CHAPTER 8**

Ex A

1. 2. 

3. 4. 

5. 6. 

7.  8. 

9.  10. 

11.  12. 

**SOLUTIONS TO PRACTICE BOOKLET TEST**

1) a) 4*x*2 + 4*x* – 3 b) *a*2 + 6*a* + 9 c) 10*x*2 -13*x*

2) a) *x*(*x* – 7) b) (*y* + 8)(*y* – 8) c) (2*x* - 1)(*x* + 3) d) (3*t* - 5)(2*t* – 1)

3) a)  b) 

4) a) h = 5 b) *x* = 0 or *x* = 8 c) p = -6 or p = 2

5) a) *x-*4 b) *x*6*y*3 c) *x*7

6) a)  b) 1 c) 

7) *x* = 3, *y* = 4

8) a)  b)  c) 

9) 

10) *p* = 3, *q* = -5