Student Name _____ ***Date Submitted*** _____

APPLICATIONS OF MATH 11 (v1)

Section 1.0 Send-In: *Following Instructions*

Complete this send-in as part of your course enrollment. This will be your first mark entered for the course. When this assignment has been received by SCIDES, your course materials will be sent to you.

This send-in consists of:

- Applications of Math Course Planner _____/ 5 marks
- Guided Practice 1.1 (p. 9) _____/ 15 marks
- Guided Practice 1.2 (p. 18) _____/ 9 marks

TOTAL: _____/ 29 marks _____%

Mail:

1) This **Cover Sheet**
2) **Return Address** (page 2 or Comment Sheet) – Fill out with your complete name and address.
3) **Send-In Assignments** – Completed above noted assignments.

*Be sure to put proper **postage** on the envelope (if necessary) and add your **return address**.*

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You are REQUIRED to fill out your return address on this page if you DOWNLOADED this Assignment. [If the Assignment was mailed to you, please fill out the back of the white page of the 3 part District Education Comment Sheet.]

Please Print Clearly

NAME	
ADDRESS	
CITY / TOWN	
PROVINCE / COUNTRY	
POSTAL CODE	

Complete your MAILING address.

Is this a change of address? ☐ **Yes** ☐ **No**

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Name: _____

___ / 5 marks

Applications of Math 11 Course Planner

Complete <u>all</u> the following contact information that applies to you and check the one that is the best way to contact you during the day:

❑ Home Phone: _____ ❑ Work Phone: _____ ❑ Cell: _____

❑ Email: _____

❑ other way to contact you (explain) _____

When is the best time for your teacher or tutor/marker to contact you? ___:_____ AM PM

Check your Grade: ❑ Grade 10 ❑ Grade 11 ❑ Grade 12 ❑ Graduated

Timetable Options/Course Plan

One of the keys to being successful in anything that you do is to take the time to plan carefully. The objective of this section is to help you create a timetable for managing your schoolwork and enable you to set goals for finishing all of your courses by your desired completion date. **Most full-time students complete 3 to 5 assignments each week.**

The flexibility of our distributed learning program offers you many choices but a plan for completion is essential to success. Most full-time students complete 8 courses in a school year (10 months). The most common timetables are "semestered" (4 courses at a time) or "linear" (8 courses at a time).

What is your planned schedule? ❑ Semester System (22 weeks) ❑ Linear System (44 weeks)

❑ other: *(explain)* _____

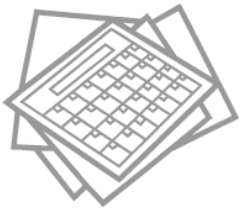
What is your intended **start** date for this course? ❑ Now ❑ Other date: _____

What is your intended **completion** date for this course? _____ (month) _____ (year)

How many courses are you taking with us this year? ____ How many with other schools/programs? _____

Applications of Math 11 consists of 8 more send-in assignments and 4 module tests. How many assignments/tests per week must you do to complete this course as planned? _____

- *Mark target submission dates on a calendar.*
- *Add this same information from other courses to help you create a schedule for completion.*
- *Record the actual dates you submit work so you can track your progress.*



Delivery Method

Applications of Math 11 is offered as a print course only. You will receive workbooks in print form and will be submitting your assignments through the regular mail.

If you have access to the Internet, you will find some great online resources to support your learning by searching for key words in the assignments.

Anything else?

Is there anything else you would like us to know about you or your education plans that will help us provide you with better service?

Lesson 1

Review of Simple Equation-Solving Techniques

Objectives

When you complete this lesson, you will be able to:

- use simple equation-solving techniques to solve linear equations (that is, equations where the highest power of x is 1)
- identify types of non-linear equations

Overview

This lesson reviews simple to complex linear equations and introduces how to solve non-linear equations. The examples review basic equation-solving techniques.

Example 1

Solve:

$3x + 4 = 7$

Solution

$$\begin{aligned} 3x + 4 &= 7 \\ 3x + 4 - 4 &= 7 - 4 \quad \text{Subtract 4 from both sides} \\ 3x &= 3 \\ \frac{3x}{3} &= \frac{3}{3} \quad \text{Divide both sides by 3} \\ x &= 1 \quad \text{Solution} \end{aligned}$$

Example 2

Solve:

$2(5x - 4) = 7(x - 2)$

Solution

$$2(5x-4) = 7(x-2)$$

$$10x-8 = 7x-14 \qquad \text{Distributive property}$$

$$10x-7x-8 = 7x-7x-14 \qquad \text{Subtract } 7x \text{ from both sides}$$

$$3x-8 = -14$$

$$3x-8+8 = -14+8 \qquad \text{Add 8 to both sides}$$

$$3x = -6$$

$$\frac{3x}{3} = \frac{-6}{3} \qquad \text{Divide both sides by 3}$$

$$x = -2 \qquad \text{Solution}$$

Example 3

Solve:

$$\frac{3x}{2} - 2 = \frac{2}{5}$$

Solution

$$\frac{3x}{2}(10) - 2(10) = \frac{2}{5}(10) \qquad \text{Multiply every term in the equation by 10}$$

10 to eliminate all fractions

$$15x-20 = 4 \qquad \text{Simply both sides.}$$

$$15x-20+20 = 4+20 \qquad \text{Add 20 to both sides.}$$

$$15x = 24$$

$$\frac{15x}{5} = \frac{24}{15} \qquad \text{Divide both sides by 15.}$$

$$x = \frac{24}{15} = \frac{8}{5} \qquad \text{Reduce for solution}$$

Example 4

Solve:

$$\frac{4x+1}{5} = \frac{6x-7}{2}$$

Solution

$$\frac{4x+1}{5} = \frac{6x-7}{2}$$

$2(4x+1) = 5(6x-7)$ Cross multiply

$8x+2 = 30x-35$ Distrubute through the brackets

$8x-30x+2 = 30x-30x-35$ Subtract $30x$ from both sides

$-22x+2 = -35$

$-22x+2-2 = -35-2$ Subtract 2 from both sides

$-22x = -37$

$\frac{-22x}{-22} = \frac{-37}{-22}$ Divide both sides by -22

$x = \frac{37}{22}$ Solution

Procedures for identifying quadratic and cubic equations are as follows:

Example 5

Identify the type of non-linear equation.

$x^2 + 5x + 6 = 0$

Solution

The equation is quadratic (or degree 2) because the greatest exponent is 2.

Example 6

Identify the type of the following non-linear equation.

$2x^3 - 3x^2 - 3x + 2 = 0$

Solution

The equation is cubic (or degree 3) because the greatest exponent is 3.

A quadratic equation may have as many as two answers, whereas a cubic equation may have as many as three answers.

Notice the following pattern:

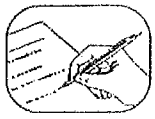
Equation	Maximum Number of Solutions
Linear	1
Quadratic	2
Cubic	3

You will learn to use your graphing calculator to solve such cubic and quadratic equations. This method will be explained in Lesson 2.

Exponential and trigonometric equations are other examples of complex equations that can be solved algebraically or by using the graphing calculator.

Exponential	$3^{2x} = 5$	x is an exponent
Trigonometric	$5\cos x - 4 = 0$	x is an angle in a cosine equation

In Lesson 2 you will solve these two types of equations using a graphing calculator.



15 marks

Guided Practice

1. Use equation-solving techniques outlined in this lesson to solve the following linear equations: 7 marks

   a. $3x - 4 = 12$

   b. $\frac{2}{3}x + \frac{5}{8} = -6$

   c. $4(3x - 5) = 7(x + 1)$

   d. $\frac{7x-3}{4} = \frac{5x+4}{9}$

   e. $\frac{5x-7}{6x+5} = \frac{-3}{4}$

   f. $\frac{-7}{5}x + 9 = 6$

   g. $\frac{2(3x-4)}{7} = \frac{5(2x+3)}{6}$

2. Identify the type of equation in each of the following: 5 marks

   a. $x^2 = -7x - 12$

   b. $2^{2x} = 16$

   c. $2x^3 + 7x^2 + 2x - 3 = 0$

   d. $2\sin x + 3 = 4$

   e. $\cos^2 x = \frac{3}{5}$

3. What is the greatest possible number of solutions for 2a.? 3 marks For 2c.? How do you know?

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Lesson 2

Using a Graphing Calculator to Solve Equations

Objectives

When you complete this lesson, you will be able to use a graphing calculator to:

- solve linear equations
- solve equations of degree 2 and greater
- solve exponential and trigonometric equations

Overview

As a review of how to graph an equation (function) of the form $y = mx + b$ on a TI-83 graphing calculator, the following examples and keying sequences are provided. See also "TI-83" Graphing Calculator Procedures" (Module 1 Attachment) at the end of this module.

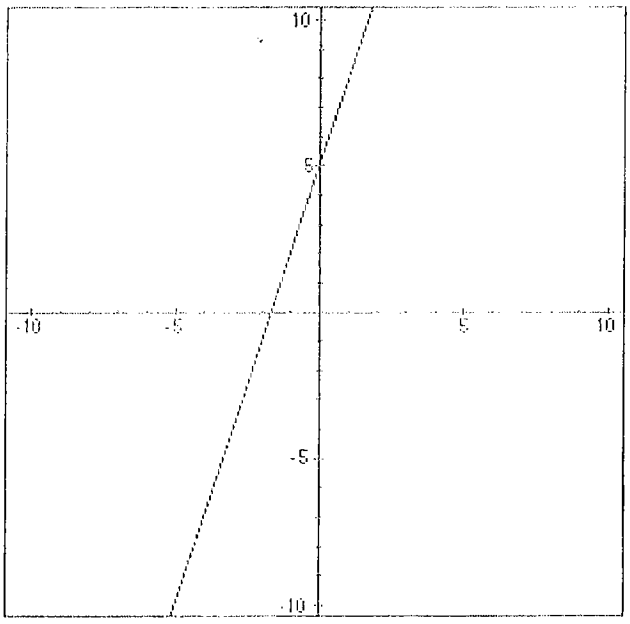
For these examples, set your WINDOW to *default* by pressing [ZOOM] [6].

Example 1

Graph: $y = 3x + 5$

Solution

[Y=] [3] [X,T,θ,*n*] [+] [5] [GRAPH] yields the following screen (based on default zoom):

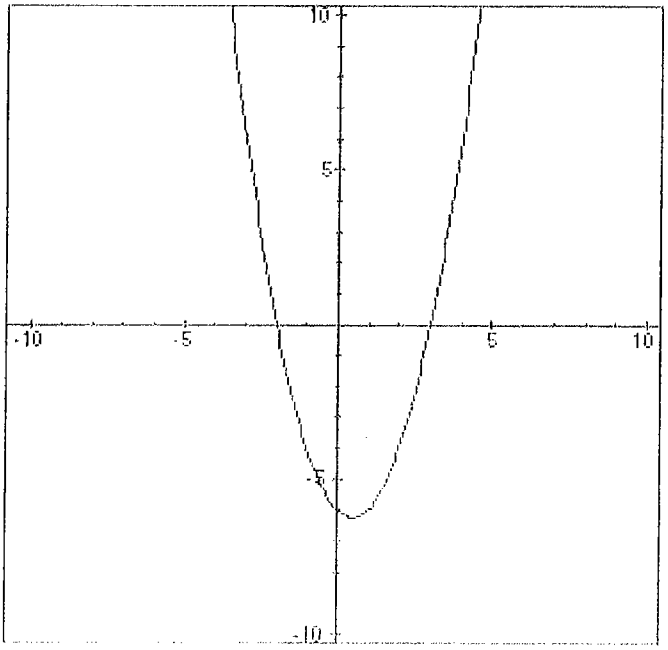


Example 2

Graph: $y = x^2 - x - 6$

Solution

[Y=][X,T,θ,*n*] [^] [2] [–] [X,T,θ,*n*] [–] [6] [GRAPH]
This graph would yield the following screen:



The following example provides a simple method for solving all equations graphically, regardless of their difficulty. It is important that you learn the technique outlined.

Example 3

Solve:

$$\frac{3x}{2} - 2 = \frac{2}{5}$$

Solution

Steps:

1. Rearrange to obtain $\frac{3x}{2} - 2 - \frac{2}{5} = 0$ (Equation 1). In other words, we want to have 0 on the right-hand side.

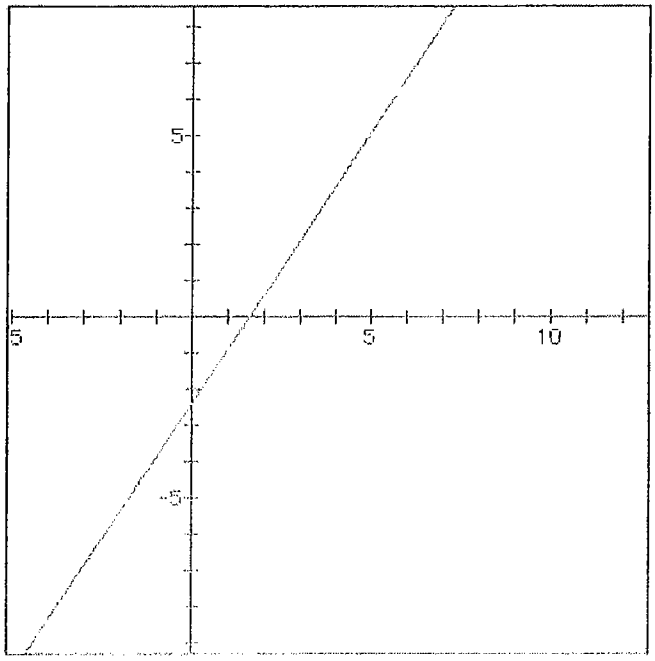
2. Form the function $y = \frac{3x}{2} - 2 - \frac{2}{5}$.

   In other words, you are replacing the 0 in Equation 1 with y.

3. Graph the function.

   Keying sequence:
   [Y=] [3] [X,T,θ,*n*] [÷] [2] [–] [2] [–] [2] [÷] [5] [GRAPH].

   This yields the following graph:



   Note that the root (or x-intercept) lies between $x = 1$ and $x = 2$.

4. Find the answers (roots) of the equation $\frac{3x}{2} - 2 - \frac{2}{5} = 0$ by finding the "zeros" of the function $y = \frac{3x}{2} - 2 - \frac{2}{5}$. The Trace Method was used in *Applications of Mathematics 10* but it is not very efficient. The following method is preferred.

   Keying sequence:

   - Press [2nd] [Calc] [2]. (i.e., "zero")
   - Set the left and right bounds for x:
     - — The left bound can be any x-value to the left of the point where the graph crosses the x-axis (e.g., $x = 1$).
     - — The right bound can be any x-value to the right of the point where the graph crosses the x-axis (e.g., $x = 2$).

To set the left bound, press [◀] until the cursor reaches the desired value, and then press [ENTER], or enter the value directly by entering 1, for example.

To set the right bound, press [▶] until the cursor reaches the desired value, and then press [ENTER], or enter the value directly by entering 2, for example.

When asked to guess, just press [ENTER] and the root will appear; in this case, $x = 1.6$.

Example 4

Solve:

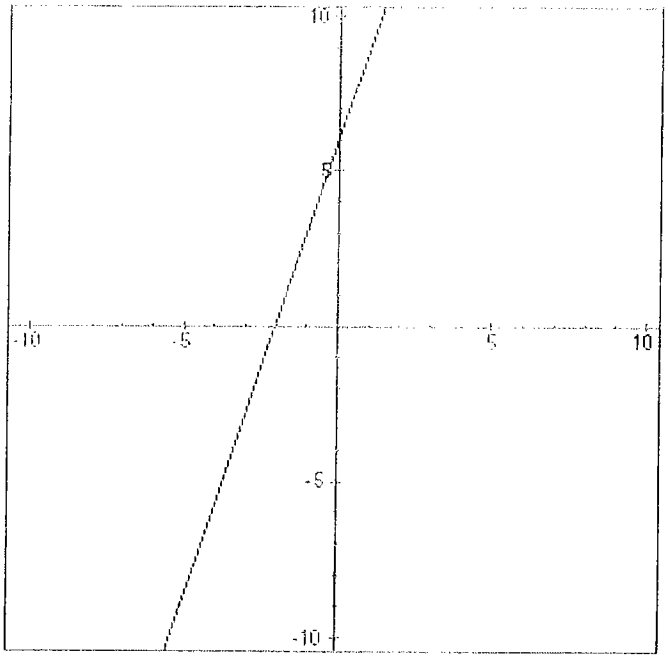
$2(5x - 4) = 7(x - 2)$

Solution

$$\begin{aligned} 2(5x - 4) &= 7(x - 2) \\ 2(5x - 4) - 7(x - 2) &= 0 \qquad \text{Subtract } 7(x - 2) \text{ from both sides to obtain 0 on the left.} \\ \text{Let } y &= 2(5x - 4) - 7(x - 2) \end{aligned}$$

Graph the function.

Keying sequence: [Y=] [2] [( ] [5] [X,T,θ,n] [–] [4] [ )] [–] [7] [( ] [X,T,θ,n] [–] [2] [)] [GRAPH]



Find the "zero" (or x-intercept) of the expression $2(5x - 4) - 7(x - 2)$.

Keying sequence: [2nd] [CALC] [2]
Set left bound to $x = -3$. Press [ENTER].
Set right bound to $x = -1$. Press [ENTER].
When asked to guess, press [ENTER].
The "zero" is $x = -2$.

Example 5

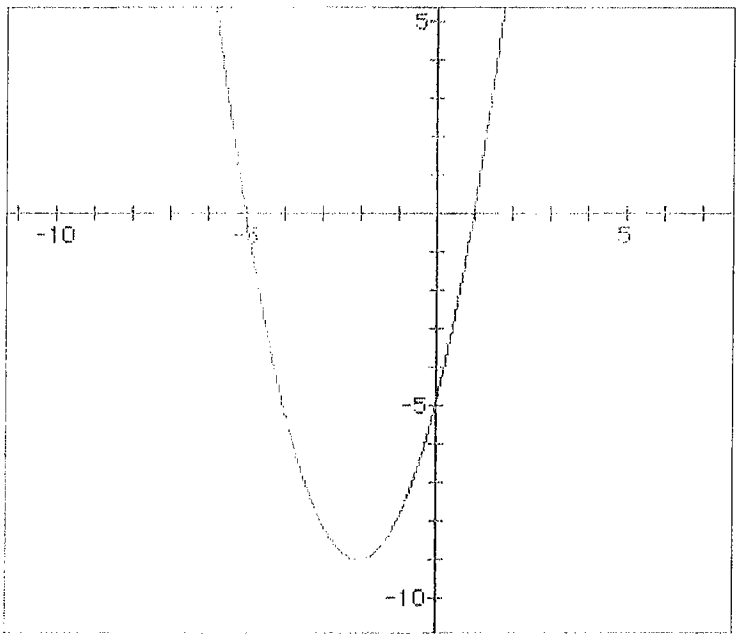
Solve:

$x^2 + 4x - 5 = 0$.

Solution

$x^2 + 4x - 5 = 0$
$y = x^2 + 4x - 5$

Graph the function.
Keying sequence: [Y=] [X,T,θ,n] [x^2] [+] [4] [X,T,θ,n] [–] [5] [GRAPH]



Find the points where the graph crosses the x-axis by using the following keying sequence: [2nd] [CALC] [2].

To find the first "zero":
Set left bound to –6. Press [ENTER].
Set right bound to –4. Press [ENTER].
When asked to guess, press [ENTER].

The root $x = -5$ will appear.
Repeat the procedure: [2nd] [CALC] [2] to find the second "zero."
Set left bound to 0. Press [ENTER].
Set right bound to 2. Press [ENTER].
When asked to guess, press [ENTER].
The root $x = 1$ will appear.

There are 2 answers:
$x = -5$ and $x = 1$

Example 6

Solve:

$3^{2x} = 5$

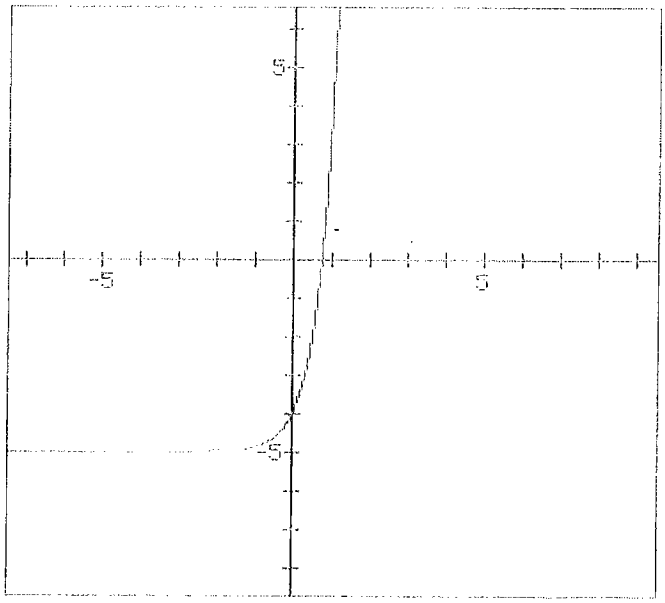
Solution

$3^{2x} - 5 = 0$

$y = 3^{2x} - 5$

Graph the equation.

Keying sequence:
[Y=] [3] [^] [( ] [2] [X,T,θ,*n*] [ )] [–] [5] [GRAPH].



Notice that the graph has only one zero.
Find the root: [2nd] [CALC] [2].
Set the left bound to $x = 0$. Press [ENTER].
Set the right bound to $x = 1$. Press [ENTER].

Press [ENTER] again to show the answer: $x = 0.7325$.

Example 7

Solve:

$5\cos x - 4 = 0$

Solution

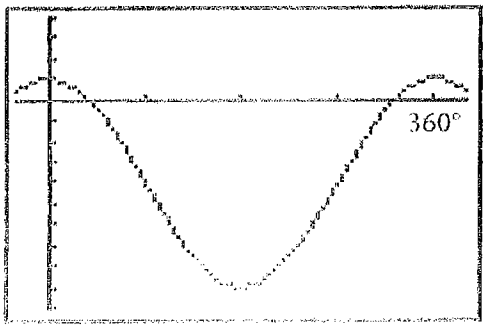
Graph: $y = 5 \cos x - 4$

For this function, set the MODE to degrees. Press [MODE]. Cursor down to the "Radian Degree" line and and press [▶] to highlight *Degree*. Press [ENTER].

Graph the equation.

Keying sequence:
[Y=] [5] [cos] [X,T,θ,*n*] [ )] [–] [4] [GRAPH].

Press [WINDOW] and change x min = –30, x max = 390, x Scl = 90, y min = –10, y max = 4, y Scl = 1. Press [GRAPH].

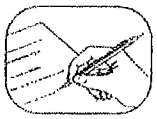


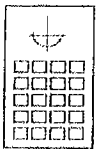
This graph is a wave that crosses the x-axis many times. Consider only the answers that lie between 0° and 360°.

Keying sequence: [2nd] [CALC] [2]
Set left bound to $x = 0°$. Press [ENTER].
Set right bound to $x = 180°$. Press [ENTER].
Press [ENTER] again to show the answer: $x = 36.9°$.

Repeat keying sequence: [2nd] (CALC) [2].
Set left bound to $x = 180°$. Press [ENTER].
Set right bound to $x = 350°$. Press [ENTER].
Press [ENTER] again to show the answer: $x = 323.1°$.

Guided Practice 9 marks





Using your graphing calculator, find the solutions to the following equations. Give solutions to two decimal places.

1. $\frac{7}{3}x - \frac{5}{8} = 0$

2. $3(x + 3) = 5(-2x + 1)$

3. $3^{2x-3} = 5$

4. $2x^2 - x - 6 = 0$

5. $x^2 = -5x + 1$

6. $4\sin x + 3 = 5$ (between $0°$ and $180°$)

7. $2\cos x = \frac{3}{5}$ (between 0^g and 180^g to one decimal place)

8. $2^{3x-2} = 4$ (Try WINDOW settings of: Xmin = –5
Xmax = 5
Xscl = 1
Ymin = –5
Ymax = 10
Yscl = 1

   By reading the x-axis scale, you should be able to set the left bound and right bound values. (The zero is between 1 and 2.)

9. $7\cos x - 5 = 0$ (between $0° - 360°$ to one decimal place)