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VCE Mathematical Methods ½
Quadratics Exam Skills [1.4]
Workbook

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Section A: Recap

Sub-Section: Factorising Quadratics

Let's quickly revise how we factorised quadratics!

Factorising Quadratics

$$y = (x - a)(x - b)$$

- Steps:

1. Divide by the coefficient of the leading term. (If applicable)
2. Consider the factors of the constant term.
3. (If Positive Constant Term): See which pair of factors can add up to the coefficient of the x term.

   (If Negative Constant Term): See which pair of factors can subtract from the coefficient of the x term.
4. Construct the linear factors.

Question 1

Factorise the following expressions:

a. $x^2 + 6x + 8$

$= (x+4)(x+2)$

b. $x^2 - 5x + 6$

$= (x-3)(x-2)$

Space for Personal Notes

Sub-Section: Perfect Squares

Let's quickly revise perfect squares!

Perfect Squares

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

- Perfect squares are special quadratic expressions that are made up of two **identical** linear factors.
- In other words, when a linear factor is squared, it becomes a perfect square.

Question 2

Factorise the following expressions using the perfect square formula.

a. $x^2 + 6x + 9$

$(x+3)^2$ //

b. $4x^2 - 12x + 9$

$(2x-3)^2$ //

Sub-Section: Difference of Squares

Let's quickly revise the difference between squares!

Difference of Squares

$$a^2 - b^2 = (a+b)(a-b)$$

Question 3

Factorise the following expressions:

a. $x^2 - 16$

$(x+4)(x-4)$

b. $9x^2 - 4$

$(3x-2)(3x+2)$

Sub-Section: Completing the Square

Let's quickly revise completing the square!

Completing the Square

- When we complete the square of a quadratic $x^2 + bx + c$, we write it in the form:

$$x^2 + bx + c = (\underline{\quad x + \tfrac{b}{2} \quad})^2 - \left(\frac{b}{2}\right)^2 + c$$

- **Steps:**

1. We halve the coefficient of x.
2. Subtract the half of the coefficient of x squared outside the square bracket.

Question 4

Complete the square for each quadratic.

a. $x^2 - 6x + 4$

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

$= (x-3)^2 - 5$ //

b. $2x^2 + 16x + 17$

$= 2(x^2 + 8x) + 17$

$= 2((x+4)^2 - 4^2) + 17$

$= 2(x+4)^2 - 32 + 17$ $= 2(x+4)^2 - 15$ //

Space for Personal Notes

Sub-Section: Solving by Factorisation

Solving by Factorisation

$$(x-a)(x-b)=0$$

$$x = a \text{ or } b$$

- Steps:
  1. Factorise the quadratic.
  2. Equate each factor to 0 and solve for x.

Null Factor Law

Question 5

Solve each of the following quadratic equations for x:

a. $x^2 - 6x + 8 = 0$

$(x-4)(x-2)=0$

$\therefore x=2$ or $x=4$

b. $2x^2 - 3x - 5 = 0$

$(2x-5)(x+1)=0$

$\therefore x=\frac{5}{2}$ or $x=-1$

Sub-Section: Quadratic Formula

Discussion: What do we do if the quadratic is not easy to factorise?

$\hookrightarrow$ Use the formula!

The Quadratic Formula

for $ax^2 + bx + c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Space for Personal Notes

~~**Question 6**~~

Solve each of the following quadratic equations for x.

a. $x^2 - 4x - 8 = 0$

b. $2x^2 + 4x + 1$

Sub-Section: Discriminant

The Discriminant

Definition:

The discriminant, often denoted by Δ (Delta), is the part **inside** the square root of the quadratic formula.

$$Discriminant = \Delta = b^2 - 4ac$$

if $\Delta > 0$, there are 2 solns.

if $\Delta = 0$, there is 1 soln.

if $\Delta < 0$, there are 0 solns.

Question 7

Determine how many unique roots exist in each of the following quadratic equations:

$$x^2 - 7x + 5 = 0$$

$$\Delta = (-7)^2 - 4(1)(5)$$
$$= 49 - 20$$
$$= 29$$

$\therefore$ As $29 > 0$, there are 2 real solns.//

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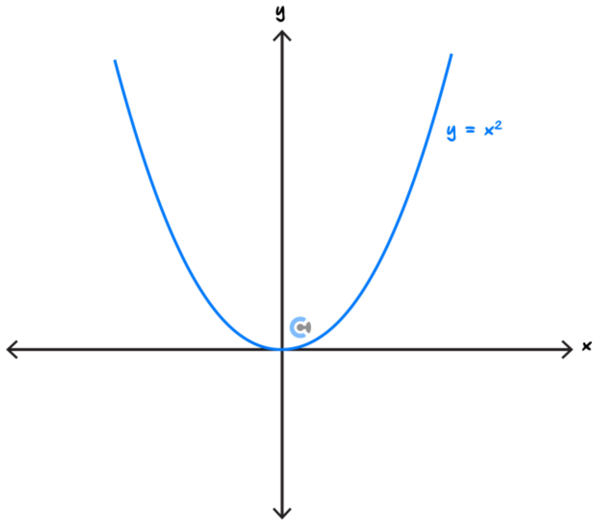
Sub-Section: Parabola and Symmetry

Definition

Parabola

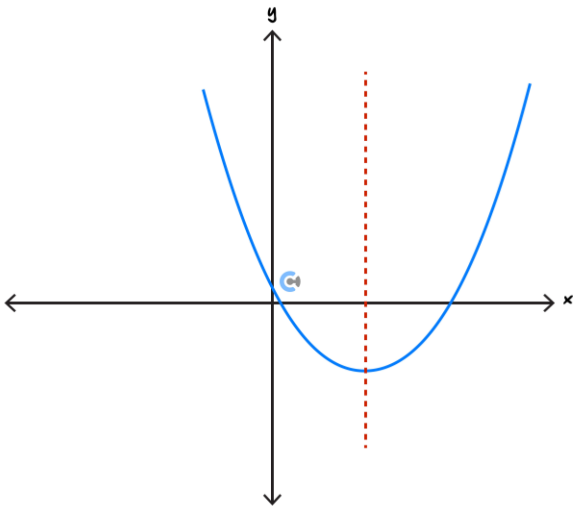
Definition:

- The shape of the graph of a quadratic is known as a ___parabola___.



Definition

Axis of Symmetry



$$\textit{Axis of symmetry}: x = -\frac{b}{2a}$$

Question 8

Find the axis of symmetry of each of the following quadratic hence, the coordinate of turning point.

$$y = 2x^2 - 6x + 5$$

$x = \frac{-(-6)}{2(2)} = \frac{6}{4} = \frac{3}{2} \longrightarrow y\left(\frac{3}{2}\right) = 2\left(\frac{9}{4}\right) - 6\left(\frac{3}{2}\right) + 5$

$= \frac{9}{2} - 9 + 5$

$= -\frac{9}{2} + 5$

$= \frac{1}{2}$ //

TP: $\left(\frac{3}{2}, \frac{1}{2}\right)$ //

NOTE: When a question asks for coordinates, you must mention both the x and y-value of the point.

Space for Personal Notes

Sub-Section: Graphing Quadratics

Turning Point Form

- The turning point form of a quadratic is given by:

$$y = a(x-h)^2 + k$$

$$\textit{Turning point} = \underline{\quad (h, k) \quad}$$

- The turning point form is obtained by **completing the square.**

Question 9

Sketch the graph of the following quadratic equation, labelling the coordinates of all axes intercepts and the turning point.

$$y = (x-2)^2 + 1$$

TP: (2,1)

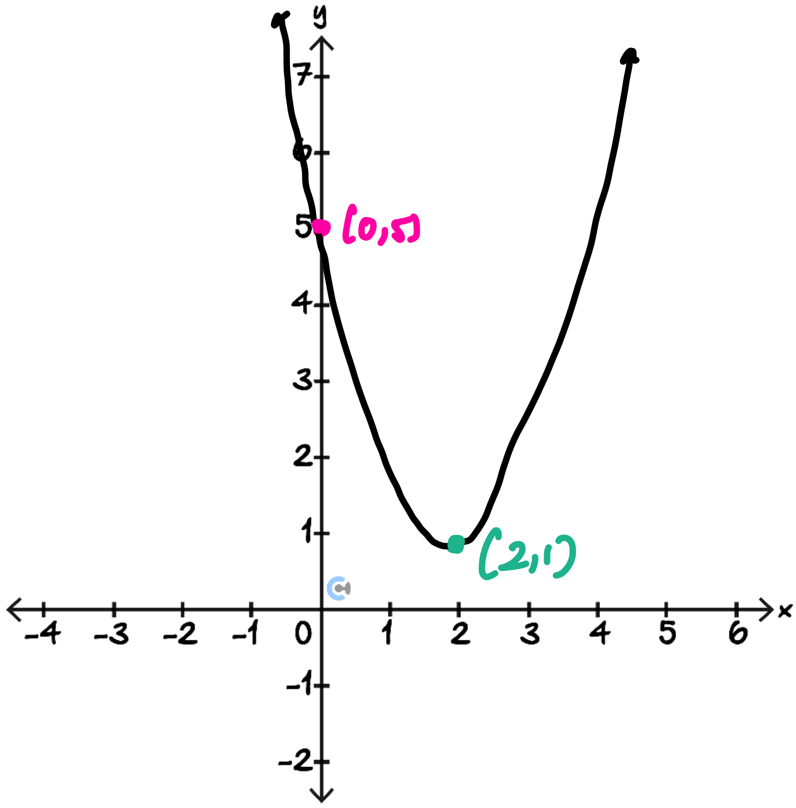
1. TP

U +ve 2. Shape

3. Ints

y-int: $x=0$

$y=(0-2)^2+1$
$=4+1=5$



Intercept Form

- The x-intercept form of a quadratic is given by:

$$y = a(x-b)(x-c)$$

$$x\text{-}intercepts: (b, 0)\ and\ (c, 0)$$

- The axis of symmetry is located exactly in the middle of the two x-intercepts.

Question 10

Sketch the graph of the following quadratic equation, labelling the coordinates of all axes intercepts, as well as the turning point.

$$y = -x^2 + 2x + \underline{\underline{8}}$$

$$y = -(x^2 - 2x - 8)$$

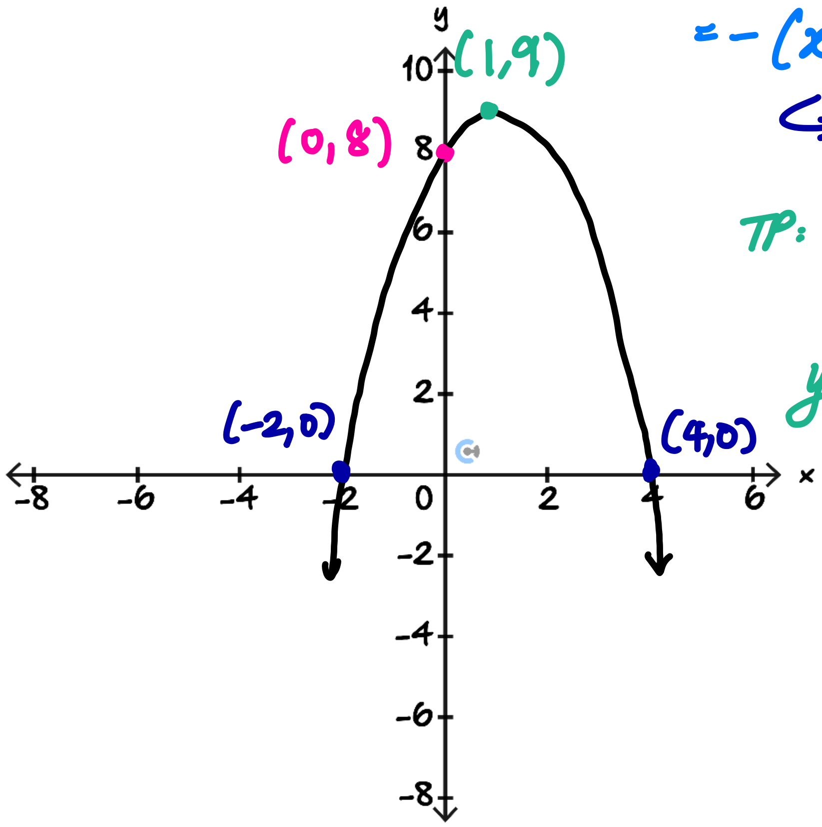
$$= -(x-4)(x+2)$$

$$\hookrightarrow x = -2, 4$$

$$TP: \quad x = \frac{-2+4}{2} = 1$$

$$y(1) = -(-3)(3)$$

$$= 9$$



NOTE: When a is negative, the x-intercepts stay the same, but the **shape** of the parabola becomes a **negative** parabola instead.

Sub-Section: Finding a Rule of a Quadratic from a Graph

Let's try to do it the other way around!

Finding the Equation of a Quadratic

- Form 1: Turning Point Form

$$y = a(x-h)^2 + k$$

TP

  - Recommended when a turning point is easy to identify.

- Form 2: x-intercept Form

$$y = a(x-b)(x-c)$$

x-int

  - Recommended when both x-intercepts are easy to identify.

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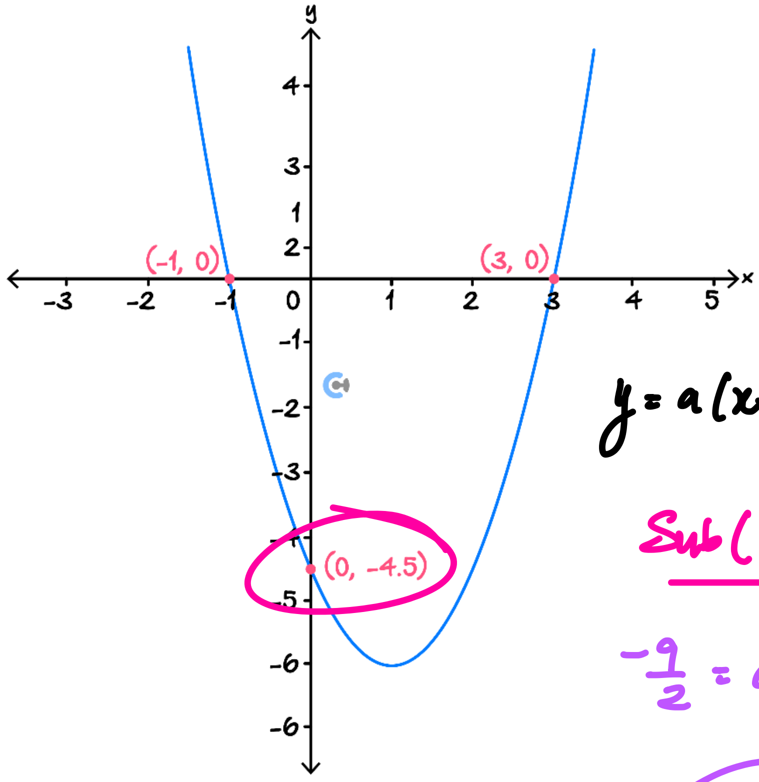
Question 11

Find the equations of the quadratics graphed below. Show your working.

a.



$y = a(x+1)(x-3)$

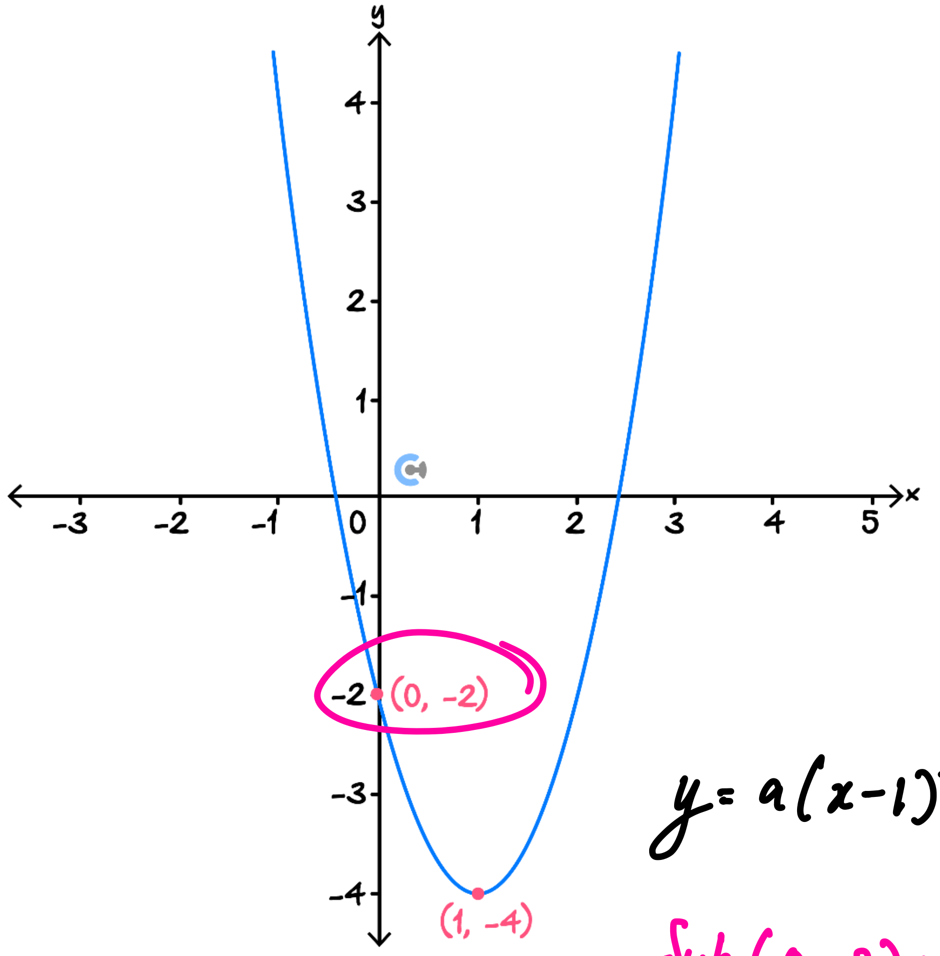
Sub $\left(0, -\frac{9}{2}\right)$:

$-\frac{9}{2} = a(1)(-3)$

$\therefore a = \frac{3}{2}$

$\therefore y = \frac{3}{2}(x+1)(x-3)$

b.



$y = a(x-1)^2 - 4$

Sub $(0,-2)$:

$-2 = a(0-1)^2 - 4$

$\therefore a = 2$

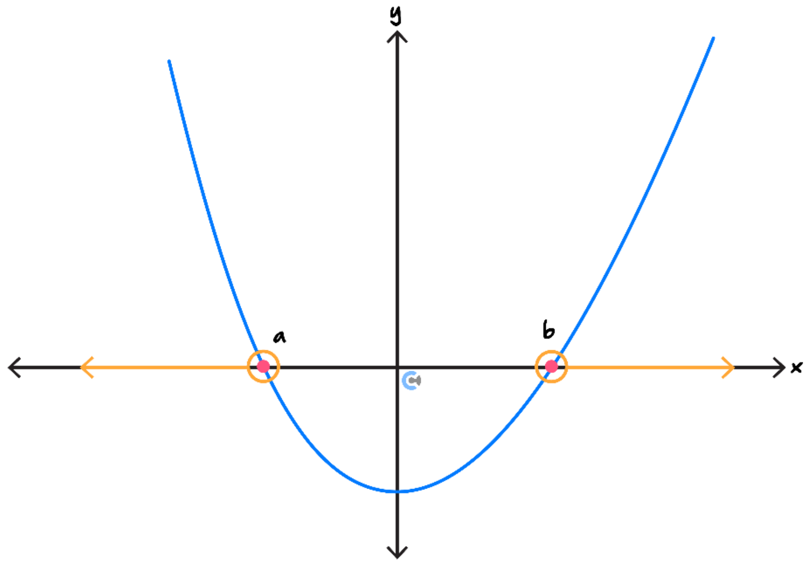
$\therefore y = 2(x-1)^2 - 4$

NOTE: Never forget the a coefficient!

Sub-Section: Quadratic Inequalities

How can we tackle quadratic inequalities?

Quadratic Inequalities



- For quadratic inequalities, we always sketch the function.
- **Steps:**

1. Sketch the function.
2. See where the y-value is within the inequality.
3. Find the corresponding x-values.

Discussion: Why do we look at y-value < 1 if the function < 1?

$y = f(x)$

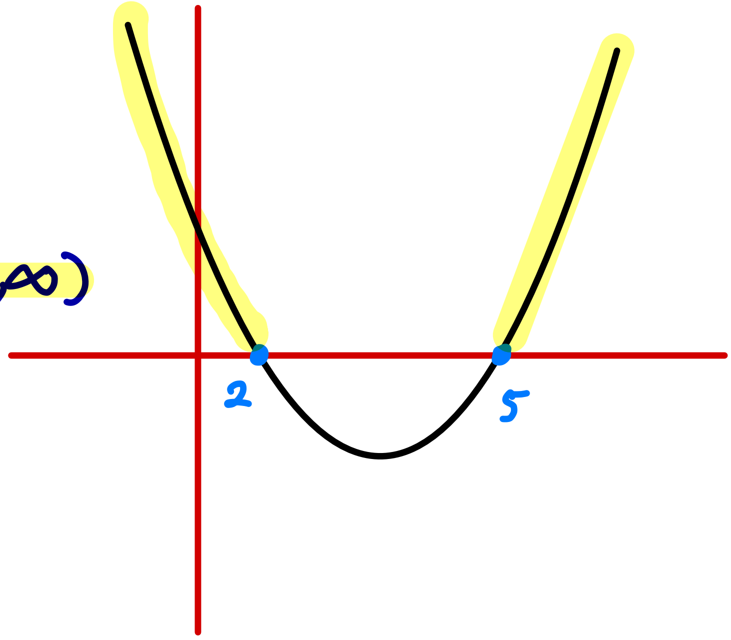
Question 12

Solve each of the following for x:

a. $(x-2)(x-5) > 0$

$\hookrightarrow x = 2, 5$

$\therefore x \in (-\infty, 2) \cup (5, \infty)$



OR

$x < 2$ or $x > 5$

OR

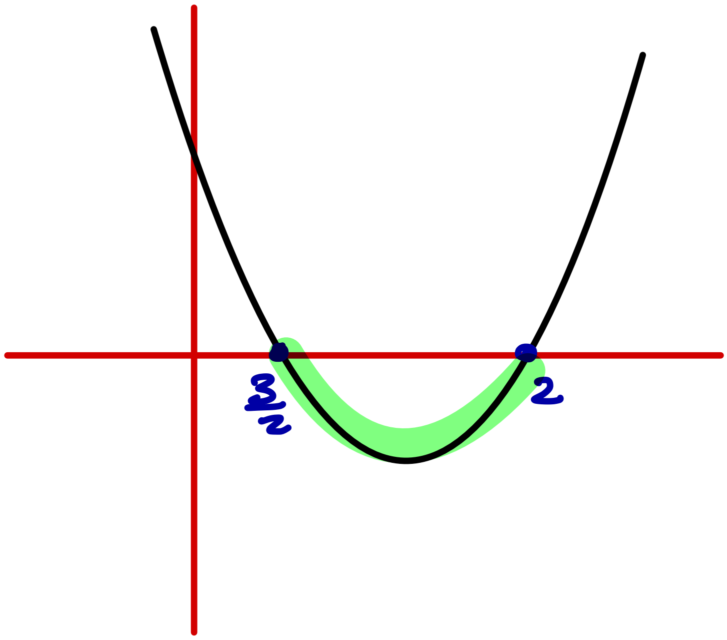
$x \in \mathbb{R} \setminus [2, 5]$

b. $2x^2 - 7x + 6 \leq 0$

$(2x-3)(x-2) \leq 0$

$\hookrightarrow x = \frac{3}{2}$ $\hookrightarrow x = 2$

$\therefore \frac{3}{2} \leq x \leq 2$



Sub-Section: Hidden Quadratics

Let's take a look at hidden quadratics!

Hidden Quadratics

- Instead of:

$$af(x)^2 + bf(x) + c = 0$$

- We can let $f(x) = X$ to have:

$$aX^2 + bX + c = 0$$

Question 13

a. Solve $(x-2)^2 + 5(x-2) + 6 = 0$ for x.

Let $a = x-2$:

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

$(a+3)(a+2) = 0$

$\therefore a = -3$ or $a = -2$

$x-2 = -3$ or $x-2 = -2$

$\therefore x = -1$ or $x = 0$

b. Solve $x^4 - 13x^2 + 36 = 0$ for x.

Let $a = x^2$:

$a^2 - 13a + 36 = 0$

$(a-9)(a-4) = 0$

$\therefore a = 4$ or $a = 9$

$\therefore x^2 = 4$ or $x^2 = 9$

$\therefore x = \pm 2$ or $x = \pm 3$

Space for Personal Notes

Section B: Quadratics Exam Skills

Sub-Section: Finding Turning Point efficiently

How do we complete the square very quickly?

Definition

Completing the square quickly.

$$y = a(x-h)^2 + k$$

- Steps

1. Find the turning point using $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$.
2. Use the leading coefficient as a.

Question 14 Walkthrough

Complete the square for $y = 2x^2 - 4x + 5$.

TP: $x = \frac{-(-4)}{2(2)} = 1$

$y(1) = 2 - 4 + 5$
$= 3$

TP: $(1, 3)$

$\therefore y = 2(x-1)^2 + 3$

Active Recall: Completing the square quickly

1. Find the turning point using $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$.
2. Use the leading coefficient as a.

Question 15

Complete the square for $y = -3x^2 + 12x - 1$.

TP: $x = \frac{-12}{2(-3)} = 2$

$y(2) = -12 + 24 - 1$
$= 11$

$\therefore y = -3(x-2)^2 + 11$

Space for Personal Notes

Sub-Section: Modelling using Quadratics

Modelling with Quadratics

- Focus on key points such as turning points, x-intercepts and y-intercepts.

Question 16 Walkthrough.

TP: (2,10)
-ve quadratic

$y=0$

A quadratic bridge has the highest point at $(2,10)$ and hits the ground at $x = 10$. $\Rightarrow$ x-int: $(10,0)$

Find the equation of the quadratic bridge.

TP: $(2,10)$ $\Rightarrow$ TP form!

-ve Quadratic : $a<0$

x-int: $(10,0)$

$\therefore y = a(x-2)^2+10$

Sub x int:

$0 = a(10-2)^2+10$

$a = \frac{-10}{64} = \frac{-5}{32}$

$\therefore y = \frac{-5}{32}(x-2)^2+10$

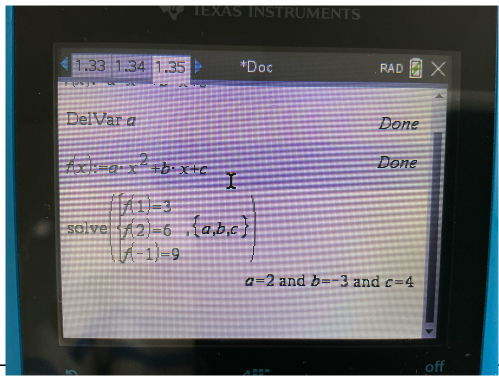
Question 17 $f(x) = ax^2+bx+c$

A ramp is modelled by a quadratic equation and passes through $(1,3)$, $(2,6)$ and $(-1,9)$.

Find the equation of the ramp.

$f(1) = 3$ $f(2)=6$ $f(-1)=9$

$\therefore f(x) = 2x^2-3x+4$



Sub-Section: Family of Functions

Family of Functions

- **Definition:** Functions with unknowns.
- **Question Type:** Find the unknown value to satisfy a certain condition.

Question 18 Walkthrough.

Consider the function $f(x) = -x^2 + 3x - k$.

Find the value(s) of k if the maximum is less than 6.

TP y-value <6

1. TP x value $= \frac{3}{2}$
2. TP y-value $= \frac{9}{4} - k$
3. Solve TP$_y < 6$, for k

TP: $x = \frac{-3}{2(-1)} = \frac{3}{2}$

$\therefore y\left(\frac{3}{2}\right) = -\frac{9}{4} + \frac{9}{2} - k$

$= \frac{9}{4} - k$

$\therefore \frac{9}{4} - k < 6 \Rightarrow k > \frac{9}{4} - 6$

$\therefore k > -\frac{15}{4}$

NOTE: When VCAA writes value(s), the number of solutions should be more than one.

ALSO NOTE: For maximum and minimum, focus on the turning points.

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Question 19

Consider the function $f(x) = 2x^2 - kx - 4$.

a. Find the x-intercepts of f in terms of k.

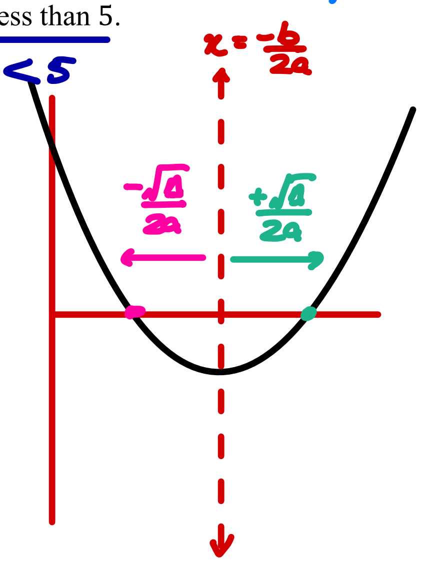
$$\therefore \quad x = \frac{-(-k) \pm \sqrt{(-k)^2 - 4(2)(-4)}}{2(2)} = \frac{k \pm \sqrt{k^2+32}}{4}$$

$$\therefore \quad x = \frac{k + \sqrt{k^2+32}}{4}$$

$$x = \frac{k - \sqrt{k^2+32}}{4}$$

b. Find the values of k such that the distance between two x-intercepts is less than 5.

$\frac{\sqrt{\Delta}}{a}$ < 5



$$\frac{\sqrt{\Delta}}{a} < 5 \Rightarrow \therefore \frac{\sqrt{k^2+32}}{2} < 5$$

$$\sqrt{k^2+32} < 10$$

$$k^2 + 32 < 100$$

$$k^2 < 68$$

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$$\therefore -\sqrt{68} < k < \sqrt{68}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a^2 < 4$ $\qquad$ $a^2 > 4$

$-2 < a < 2$ $\qquad$ $a > 2 \quad > +\sqrt{}$

$-\sqrt{} < a < +\sqrt{}$ $\qquad$ $a < -2 \quad < -\sqrt{}$

Section C: Exam 1 (20 Marks)

Question 1 (3 marks)

The sum of two children's age is 7 and the product of their ages is 12.

a. Write down a quadratic equation in the form $ax^2 + bx + c = 0$ that can be solved to find the ages of the children. (1 mark)

$x^2 + 7x + 12 = 0$

$\begin{cases} x + y = 7 \\ x \cdot y = 12 \end{cases}$

b. Find the ages of the children. (2 marks)

$(x+3)(x+4) = 0$

$\therefore$ The ages are 3, 4.

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Question 2 (4 marks)

Consider the function $f(x) = x^2 - 3x - 4$.

a. Solve the equation $f(x) = 0$. (1 mark)

$x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0 \quad \therefore x = -1$ or $x = 4$

b. Sketch the graph of $y = f(x)$ on the axes below. Label the turning point and all axes intercept with coordinates. (2 marks)

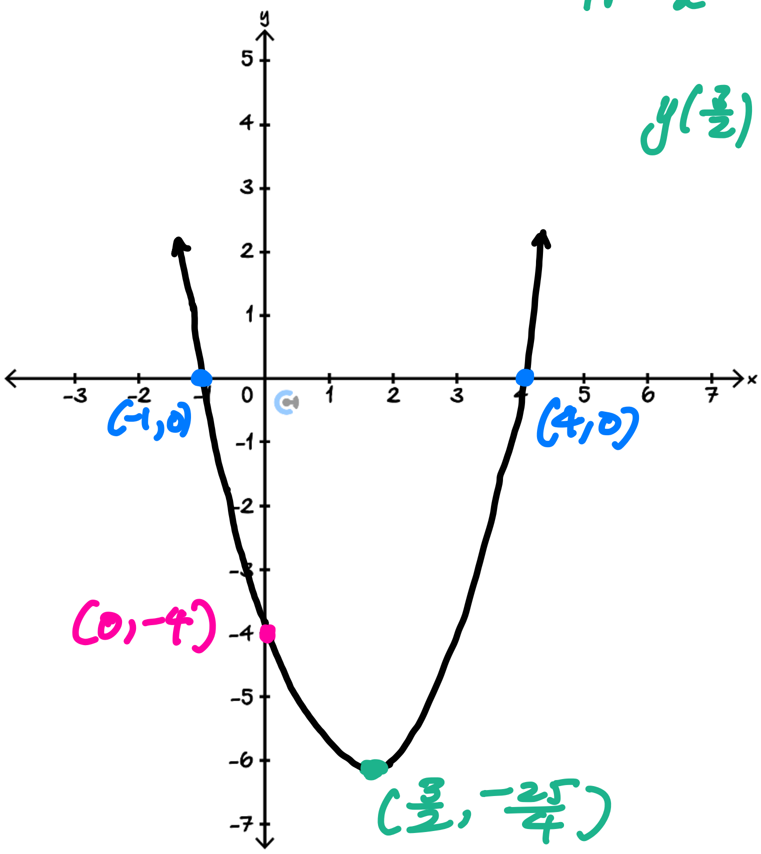
TP: $x = \frac{4-1}{2} = \frac{3}{2}$

$y\left(\frac{3}{2}\right) = \left(\frac{3}{2}\right)^2 - 3\left(\frac{3}{2}\right) - 4$

$= \frac{9}{4} - \frac{9}{2} - 4$

$= -\frac{9}{4} - 4$

$= -\frac{25}{4}$



c. Hence, find the value(s) of x such that $f(x) + 4 < 0$. (1 mark)

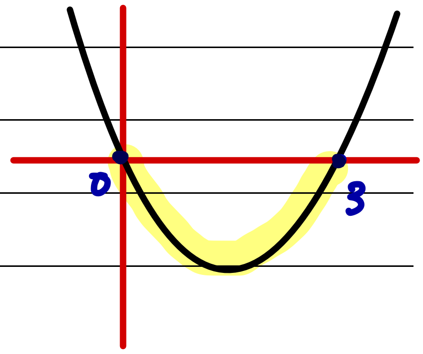
$x^2 - 3x - 4 + 4 < 0$

$x^2 - 3x < 0$

$x(x-3) < 0$

$\hookrightarrow x = 0 \quad \hookrightarrow x = 3$

$\therefore \underline{0 < x < 3}$



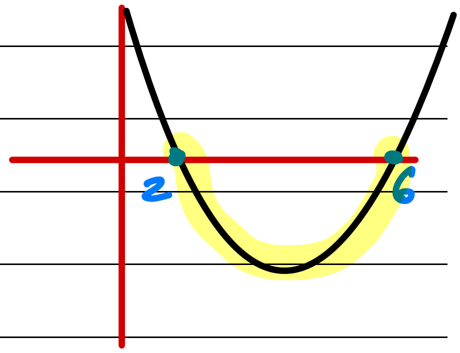
Question 3 (2 marks)

Solve the inequality $x^2 - 8x + 12 \leq 0$.

$(x-6)(x-2) \leq 0$

$\hookrightarrow x = 6 \quad \hookrightarrow x = 2$

$\therefore \; 2 \leq x \leq 6$



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Question 4 (3 marks)

Solve the equation $x^4 + 5x^2 - 36 = 0$, for real values of x.

Let $a = x^2$:

$a^2 + 5a - 36 = 0$

$(a+9)(a-4) = 0$

$a = -9$ or $a = 4$

reject as $a \geq 0$

$x^2 = 4$

$\therefore x = \pm 2$

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Question 5 (3 marks)

Consider the function $f(x) = x^2 - 2kx + 5$, where k is a real number. Find all possible values of k if $f(x)$ is always greater than 1.

$f(x) > 1$

$\therefore x^2 - 2kx + 5 > 1$

$x^2 - 2kx + 4 > 0$

$\therefore \boxed{\Delta < 0}$

$\Delta = (-2k)^2 - 4(1)(4) < 0$

$4k^2 - 16 < 0$

$k^2 - 4 < 0$

$k^2 < 4$

$\Downarrow$

$\therefore -2 < k < 2$

Question 6 (5 marks)

Consider the function $f(x) = x^2 - kx - 1$, where k is a real number.

a. Show that the graph $y = f(x)$ always has two x-intercepts.(1 mark)

$\Delta > 0$

$\Delta = (-k)^2 - 4(1)(-1) > 0$

$k^2 + 4 > 0$

$\therefore$ As $k^2 \geq 0$,

$\therefore k^2 + 4 > 0$

and thus this statement is always true.

b. Find the values of k such that the distance between the two x-intercepts is less than 4. (3 marks)

$\frac{\sqrt{k^2+4}}{1} < 4$

$k^2+4<16$

$k^2<12$

$\Downarrow$

$-\sqrt{12}<k<\sqrt{12}$

$\frac{\sqrt{\Delta}}{a}$ <4

$\sqrt{12} = \sqrt{4} \times \sqrt{3}$

$= 2\sqrt{3}$

$\therefore -2\sqrt{3} < k < 2\sqrt{3}$

c. Find the minimum possible distance between the two x-intercepts. (1 mark)

lowest

$\frac{\sqrt{\Delta}}{a}$

$\therefore$ min of $\sqrt{k^2+4}$

1. Make inside as small as possible ($\sqrt{\ }$)

k^2+4

2. Make k^2 as small as possible

$\Downarrow$

$k^2=0 \Rightarrow k=0$

$\therefore$ Min distance $= \sqrt{0^2+4}$

$= 2$

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Section D: Tech Active Exam Skills

Calculator Commands: Solving equations

Mathematica

- Solve[].

In[122]:= `Solve[x^2 - 4 x - 9 == 0, x]`

Out[122]= $\{\{x \to 2 - \sqrt{13}\}, \{x \to 2 + \sqrt{13}\}\}$

TI-Nspire

- Menu→3→1.

$\text{solve}(x^2-4\cdot x-9=0,x)$ $\quad x=-(\sqrt{13}-2)$ or $x=\sqrt{13}+2$

Casio Classpad

- Action→Advanced→Solve.

solve(x^2−4x−9=0, x)

$\{x=-\sqrt{13}+2,\ x=\sqrt{13}+2\}$

Calculator Commands: Completing the Square

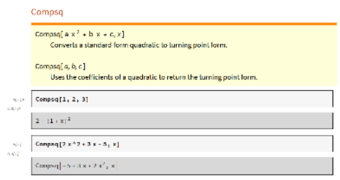
TI-Nspire

- Menu→3→5 completeSquare (func, var).

$\text{completeSquare}(x^2-6\cdot x+8,x)$ $\quad (x-3)^2-1$

Mathematica

- no inbuilt function need udf.



Casio Classpad

- No function.

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Section E: Exam 2 (19 Marks)

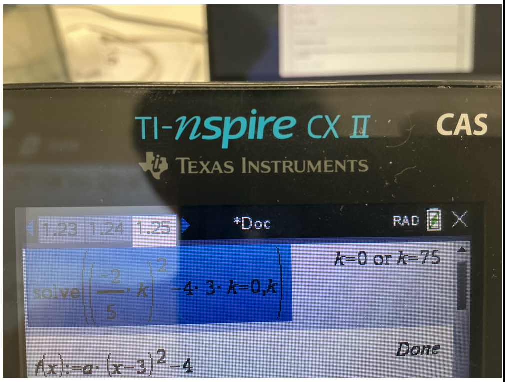
Question 7 (1 mark)

$\Delta = 0$

Find the value(s) of k for which the quadratic equation below has exactly one unique real solution.

$$3x^2 - \frac{2}{5}kx + k = 0$$

$(-\frac{2}{5}k)^2 - 4(3)(k) = 0$



A. $k = -75$

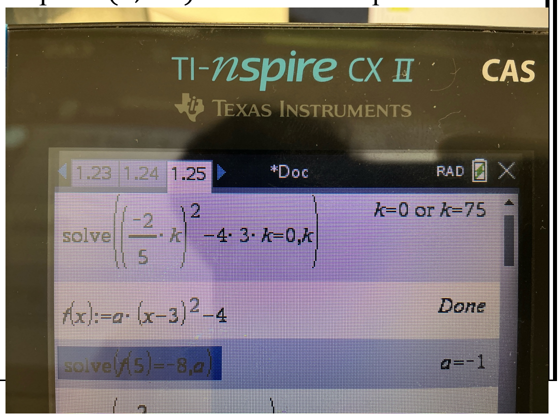
B. $k = 0{,}75$

C. $k = \frac{2}{5}$

D. $k = 0{,}50$

Question 8 (1 mark)

A quadratic function has a turning point at $(3, -4)$ and goes through the point $(5, -8)$. What is the equation of the function?



~~**A.**~~ $-(x-3)^2 + 4$

~~**B.**~~ $(x-3)^2 - 4$

~~**C.**~~ $-(x+3)^2 - 4$

D. $-(x-3)^2 - 4$

Question 9 (1 mark)

The fimction $f(x) = 3x^2 + mx + 5$ is always greater than 2. The possible of m are:

A. $m = \pm 10$

B. $0 < m < 12$

C. $-6 < m < 6$

D. $-9 < m < 9$

$3x^2 + mx + 5 > 2$

$3x^2 + mx + 3 > 0$

$\Delta < 0$

$m^2 - 4(3)(3) < 0$

$m^2 < 36$

$\therefore -6 < m < 6$

Question 10 (1 mark)

$f(-4) = 0$

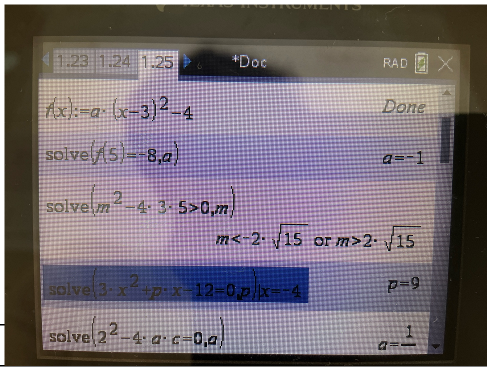
If one root of the quadratic equation $3x^2 + px - 12 = 0$ is -4, the value of p is:

A. -9

B. 9

C. -4

D. 4



Question 11 (1 mark)

The equation $ax^2 + 2x + c = 0$ has only one real solution if:

$\Delta = 0$

A. $c^2 = 4a$

B. $c^2 < 4a$

$2^2 - 4(a)(c) = 0$

C. $c^2 > 4a$

D. $ac = 1$

$4 = 4ac$

$ac = 1$

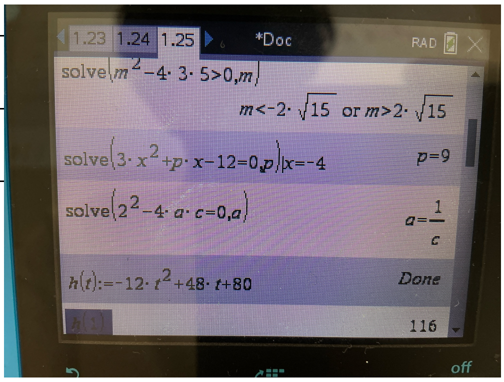
Question 12 (7 marks)

Emily is standing at the top of a cliff overlooking the ocean. She is 80 metres above the ocean. She tosses a ball into the air. The height, h, of the ball after t seconds is given by:

$$h = -12t^2 + 48t + 80.$$

a. What is the height of the ball above the ocean after $t = 1$ second? (1 mark)

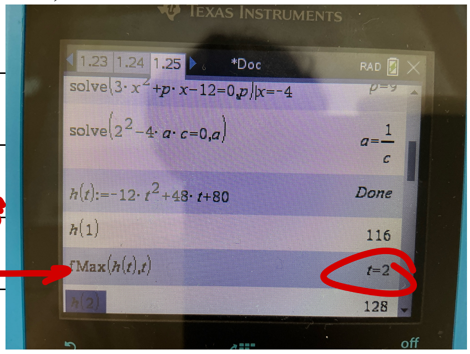
$h(1) = 116\text{m}$ //



b. What is the maximum height above the ocean that the ball reaches? (1 mark)

$\therefore h(2) = 128\text{m}$ //

Menu → 4 → 7/8



c. What is the time taken for the ball to reach its maximum height? (1 mark)

$\therefore t = 2$ seconds

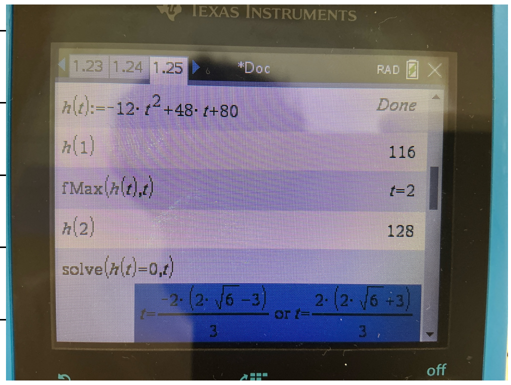
d. How many seconds does it take for the ball to land in the ocean? Give an exact value. (2 marks)

$\because h(t) = 0$

$\therefore h(t) = 0$

$\therefore t = 2 - \frac{4\sqrt{6}}{3}$ or reject as $t \geq 0$

$t = 2 + \frac{4\sqrt{6}}{3}$ seconds //



$t > 0$

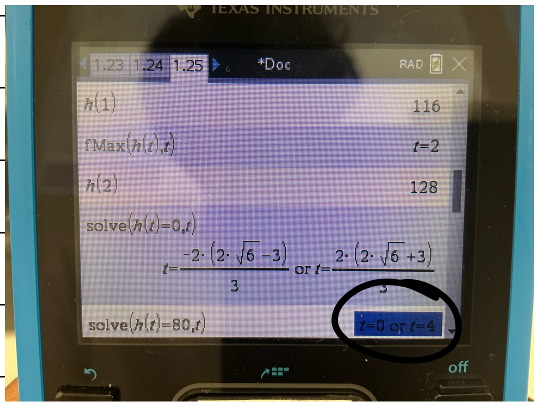
e. After Emily throws the ball upwards, when exactly does the ball pass her on its way down? (2 marks)

$h(t) = 80$

$\because h(t) = 80$

$t = 0$ or $t = 4$ seconds

reject as $t > 0$



Question 13 (7 marks)

A cricket player hits a ball, and the ball's trajectory is modelled by the quadratic equation:

$$h(x) = ax^2 + bx + c,$$

Where $h(x)$ is the height of the ball (in metres) above the ground, and x is the horizontal distance (in metres) from where the ball was hit.

The following conditions are given:

$h(0) = 1.2$

- The ball is hit from a height of 1.2 metres, i.e., $h(0) = 1.2$.

$h(15)=25$

- The ball reaches a height of 25 metres when it has traveled 15 metres horizontally.

y x

$h(30)=0$

- The ball hits the ground after travelling 30 metres horizontally, i.e., $h(30) = 0$.

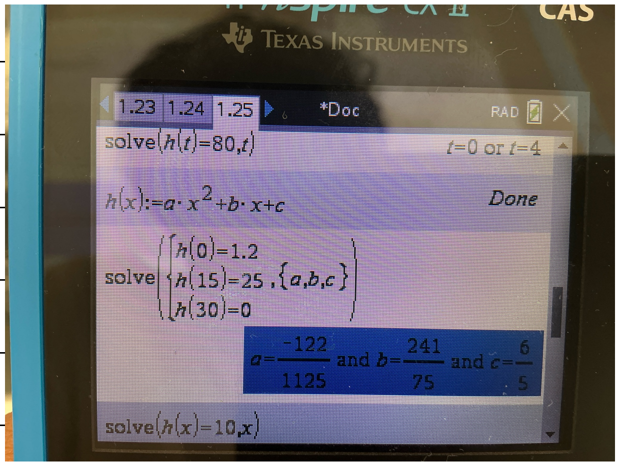
$y=0$ x

a. Using the given conditions, set up and solve a system of equations to determine the values of a, b, and c. (3 marks)

$\therefore a = \frac{-122}{1125}$,

$b = \frac{241}{75}$,

$c = \frac{6}{5}$ //



x?

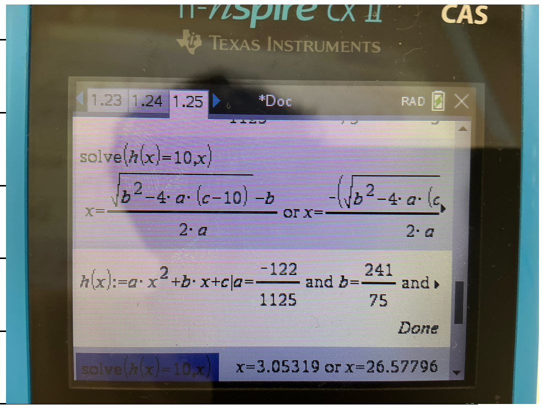
b. Determine the horizontal distance the ball has travelled when its height is 10 metres. Provide both possible values of x correct to two decimal places. (2 marks)

$y = 10$

$h(x) = 10$

$\therefore x = 3.05\text{m}$ or

$x = 26.58\text{m}$ //



Another player hits a ball, and the ball's trajectory is modelled by a quadratic equation $h_2(x)$.

This player's ball:

- Is hit from a height of 1.5 metres, i.e., $h_2(0) = 1.5$,
- Reaches its maximum height of 20 metres at a horizontal distance of 10 metres.

$h(0) = 1.5$

$h(10) = 20$

TP

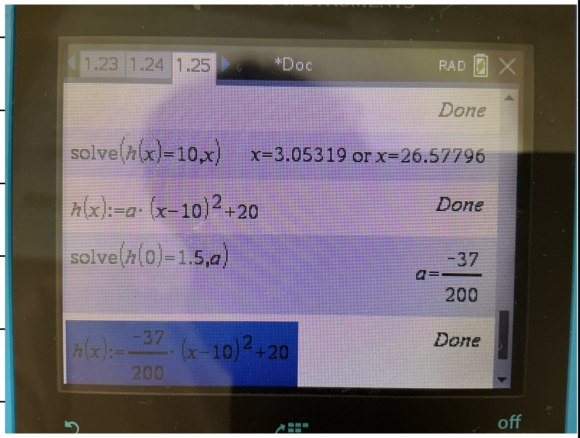
$y = 20$

$x = 10$

c. Find the equation of $h_2(x)$ in turning point form. (2 marks)

-ve quadratic

$\therefore y = \frac{-37}{200}(x-10)^2 + 20$



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Contour Check

Learning Objective: [1.1.1] – Find factorised form of quadratics

Key Takeaways

- Perfect square is in the form of ______________________________.
- Differences of squares are in the form of $a^2 - b^2$_________________________.
- Complete the square form of $x^2 + bx + c =$ ________________________.

Learning Objective: [1.1.2] – Find solutions and number of solutions to quadratic equations

Key Takeaways

- We can solve for quadratic equations by first ______________.
- Alternatively, we can use the quadratic formula given by $x =$ ________________.
- The discriminant is given by _______________ which dictates the number of solutions.

Learning Objective: [1.1.3] – Graph and find rules from the graph of quadratic equations

Key Takeaways

- Every quadratic can be put into the turning point given by $y =$ _________________.
- ________ all quadratic can be put into the x-intercept form given by $y =$ _________________.
- We can use x-intercept form or turning point form to find the rule.

Learning Objective: [1.1.4] – Solving Quadratic Inequalities and hidden quadratics

Key Takeaways

- [ ] For quadratic inequalities, we always ________________.
- [ ] For hidden quadratics, look for the pattern of something and something ____________________.

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