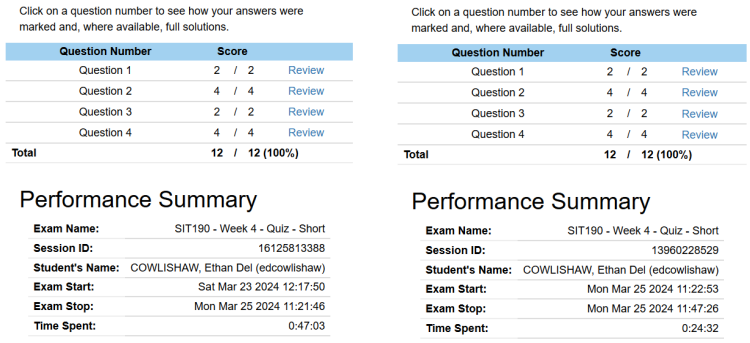
Task 1 - Give it a go

SIT190 - Week 4 - Quiz - Short SIT190 - Week 4 - Quiz - Short



Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	2 / 2	Review
Question 2	4 / 4	Review
Question 3	2 / 2	Review
Question 4	4 / 4	Review
Total	**12 / 12 (100%)**	

Performance Summary

Exam Name:	SIT190 - Week 4 - Quiz - Short
Session ID:	16125813388
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Sat Mar 23 2024 12:17:50
Exam Stop:	Mon Mar 25 2024 11:21:46
Time Spent:	0:47:03

Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	2 / 2	Review
Question 2	4 / 4	Review
Question 3	2 / 2	Review
Question 4	4 / 4	Review
Total	**12 / 12 (100%)**	

Performance Summary

Exam Name:	SIT190 - Week 4 - Quiz - Short
Session ID:	13960228529
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Mon Mar 25 2024 11:22:53
Exam Stop:	Mon Mar 25 2024 11:47:26
Time Spent:	0:24:32

2a) I did achieve full marks in the first give it a go. I struggled significantly remembering each method of finding the solutions though. I need to understand how to find the x and y-intercepts of cubics faster.

2b) I will study and read the materials found within the Week 4 pre-reading material. If those do not help significantly, I will then look to a service like YouTube to see if they help. I will then ask the teacher to help me find them.

2c) The cubic question at the end was my biggest problem. The next hardest struggle was the factorising of the first questions. I studied the materials and began to understood the operations better. I made a basic mistake when taking a multiplication and multiplying it on the other side instead of dividing. I will pay more attention next time about the order of operations.

\4) I improved time-wise by around 22 minutes which I suspect is due to my understanding improving. I focused intently on the order of operations and the factoring rules so I could accomplish the questions logically rather than by feeling. Reading the materials was a lot more helpful than I thought it would be, so I will be sure to do that again when I am stuck before wasting time trying to find a decent video on YouTube.

Task 2 - Quadratics

1. Factorise the following quadratics

a) $x^2 - 2x - 24$

- 24 factors:
  - 3 and $-8 = -24$, added $= -5$
  - 4 and $6 = 24$, added $= 10$
  - -4 and $6 = -24$ added $= 2$
  - -6 and $4 = -24$ added $= -2$. We'll pick this one.

  Therefore, the best factors are -6 and 4.

  -> $(x - 6)(x + 4)$

b) $3x^2 - 9x + 6$

6 factors:

- -2 and $-3 = 6$, added $= -5$. We'll pick this one.
- -1 and $-6 = 6$, added = -7

Ideally, the end equation will look similar to this one: $(x - 3)(x - 2)$
It cannot be this though as there is an a value > 1

Since there is an a value that isn't 1, we find a common factor between a and b that coincides with factors for 6:
-> $(3x^2 - 9x) + 6$
-> $3x(x - 3) + 6$

With this, we can split it into the factors:
-> $3x(x - 3) + 6$
-> $(3x - 3)(x - 2)$
or
-> $3(x - 3)(x - 2)$

c) $x^2 - 36$

- -36 factors:
  - -6 and $6 = -36$, added $= 0$
  -> $(x - 6)(x + 6)$

2. Use the quadratic formula to solve the following quadratics for x

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

a) $x^2 - 3x - 15 = 0$

$a = 1 : b = -3 : c = -15$
$x = \frac{--3 \pm \sqrt{-3^2 - 4(1)(-15)}}{2(1)}$
-> $x = \frac{3 \pm \sqrt{9 - -60}}{2}$
-> $x = \frac{3 \pm \sqrt{69}}{2}$

$x^+ = \frac{3 + \sqrt{69}}{2}$
$x^- = \frac{3 - \sqrt{69}}{2}$

b) $5x^2 - 5x + 2 = 0$

$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(5)(2)}}{2(5)}$
-> $x = \frac{5 \pm \sqrt{25 - 40}}{10}$
-> $x = \frac{5 \pm \sqrt{-15}}{10}$

x has no real solutions. Here are the complex solutions:
$x^+ = \frac{5 + \sqrt{-15}}{10}$

$x^- = \frac{5-\sqrt{-15}}{10}$

3. Identify the shape of each quadratic, explain why, and find the x/y intercepts

a) $y = -x^2 + 3x - 7$

The shape is a downwards facing (frowning) parabola. The coefficient of a is -1 which tells us that the parabola is downwards facing.

y-intercept

$y = -x^2 + 3x - 7$
-> $y = -(0)^2 + 3(0) - 7$
-> $y = -7$

x-intercept

$y = -x^2 + 3x - 7$
-> $0 = -x^2 + 3x - 7$
-> $x = \frac{-(3)\pm\sqrt{(3)^2-4(-1)(-7)}}{2(-1)}$
-> $x = \frac{-3\pm\sqrt{9-28}}{-2}$
-> $x = \frac{-3\pm\sqrt{-19}}{-2}$

There are no real x-intercepts. The complex numbered intercepts are:
-> $x^+ = \frac{-3+\sqrt{-19}}{-2}$
-> $x^- = \frac{-3-\sqrt{-19}}{-2}$

b) $f(x) = x^2 - 5x$

The shape is an upwards facing (smiling) parabola. The coefficient of a is 1 which tells us that the parabola is upwards facing.

y-intercept

$f(x) = x^2 - 5x$
-> $y = 0^2 - 5(0)$
-> $y = 0$

x-intercept

$f(x) = x^2 - 5x$
-> $0 = x^2 - 5x$
-> $x = \frac{-(-5)\pm\sqrt{(-5)^2-4(1)(0)}}{2(1)}$
-> $x = \frac{5\pm\sqrt{25}}{2}$
-> $x = \frac{5\pm5}{2}$

$x^+ = \frac{10}{2} = 5$
$x^- = \frac{0}{2} = 0$

4. Explain whether the graph in figure 1 is $y = -x^2 + 6x - 8$ or $f(x) = x^2 - 4x$

It is the first equation, $y = -x^2 + 6x - 8$ for two reasons. The first being that the parabola is downwards facing (frowny) and the requirement for that is the coefficient of a being -1 which the second equation does not have.
The second reason is that the y intercept on the first equation is -8, whereas the y intercept in the first is $y = 0^2 - 4(0) = 0$.
For these two reasons, it must be the first equation.

5. Sketch the quadratic $y = x^2 - 24x + 80$, providing all working

The shape is an upwards-facing parabola as the coefficient of a is $+1$.

y-intercept

$y = x^2 - 24x + 80$
-> $y = 0^2 - 24(0) + 80$
-> $y = 80$

x-intercept

$y = x^2 - 24x + 80$
-> $0 = x^2 - 24x + 80$
-> $x = \frac{-(-24) \pm \sqrt{(-24)^2 - 4(1)(80)}}{2(1)}$
-> $x = \frac{24 \pm \sqrt{576 - 320}}{2}$
-> $x = \frac{24 \pm \sqrt{256}}{2}$
-> $x = \frac{24 \pm 16}{2}$

$x^+ = \frac{40}{2} = 20$
$x^- = \frac{8}{2} = 4$

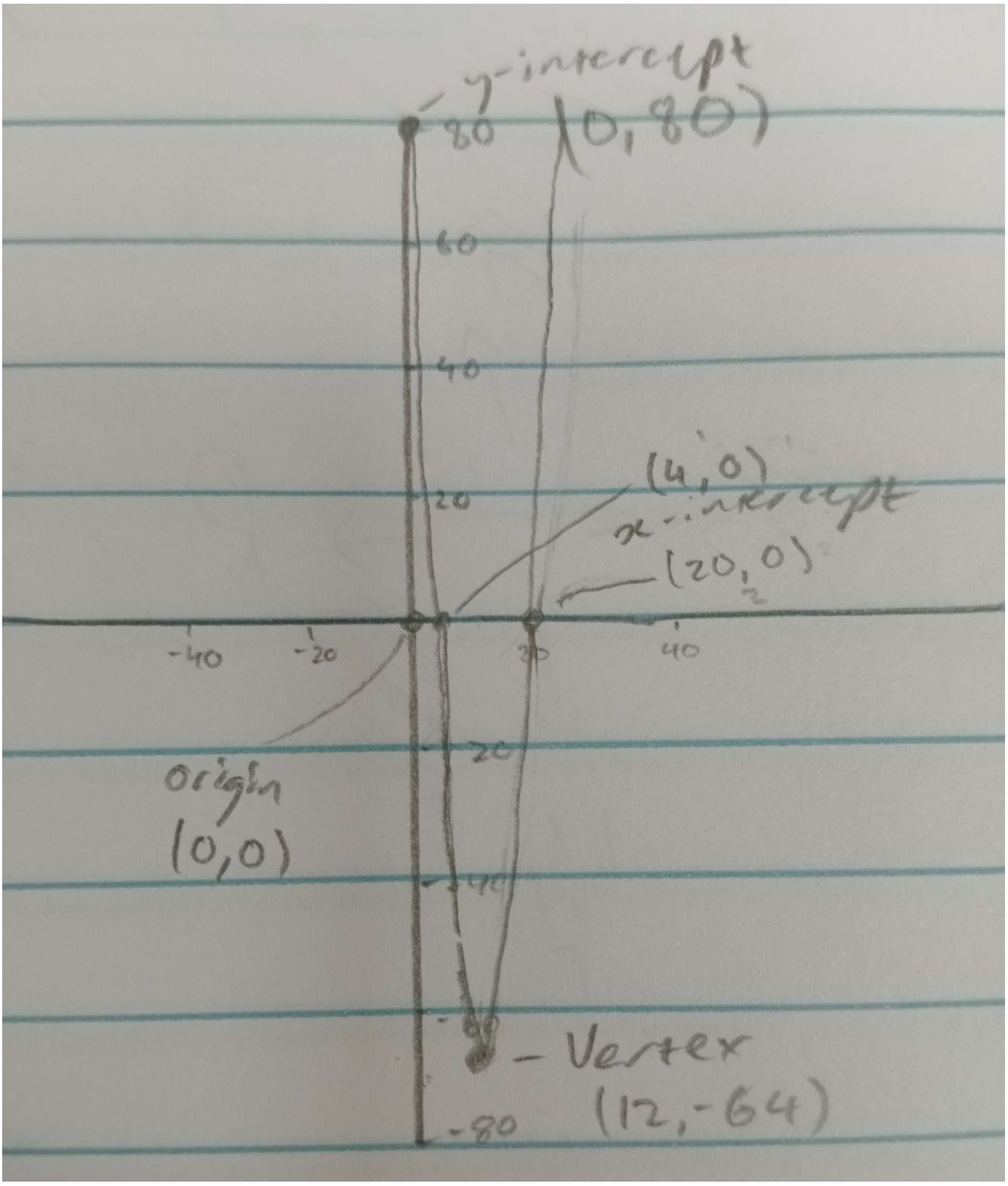
Vertex

$x = \frac{-b}{2a}$
-> $\frac{-24}{2(1)} = \frac{24}{2} = 12$

$y = x^2 - 24x + 80$
-> $12^2 - 24(12) + 80$
-> $144 - 288 + 80$
-> $144 - 368$
-> $y = -64$

Vertex $= (12, -64)$

Graph


y-intercept
(0, 80)
80
60
40
20
(4, 0)
x-intercept
(20, 0)
-40
-20
20
40
origin
(0, 0)
-20
-40
-60
-80
- Vertex
(12, -64)