PDP Chapter 5 Review

Name: Period: Date:

1. (a) Factorize $3x^2 + 13x - 10$.

$3x^2+15x-2x-10$
$3x(x+5)-2(x+5)$
$(x+5)(3x-2)$

(2)

(b) Solve the equation $3x^2 + 13x - 10 = 0$.

$(x+5)(3x-2)=0$
$x+5=0 \quad x=-5$
$3x-2=0 \quad 3x=2 \quad x=2/3$
$\{-5, 2/3\}$

(2)

Consider a function $f(x) = 3x^2 + 13x - 10$.

(c) Find the equation of the axis of symmetry on the graph of this function.

$x=\frac{-13}{2(3)}$ $x=-\frac{13}{6}$

(2)

(d) Calculate the minimum value of this function.

$3\left(\frac{-13}{6}\right)^2+13\left(\frac{-13}{6}\right)-10 \rightarrow \frac{169}{12}-\frac{169}{6}-10$
$3\left(\frac{169}{36}\right)+\left(\frac{-169}{6}\right)-10$
$\frac{169}{12}-\frac{338}{12}-\frac{120}{12}=\frac{-289}{12}$ or -24.08

(2)

(Total 8 marks)

2. Let $f(x) = x^2 - 3x - 10$.

(a) Factorize $x^2 - 3x - 10$..

$(x-5)(x+2)$

(2)

(b) Hence, or otherwise, solve the equation $x^2 - 3x - 10 = 0$.

$(x-5)(x+2)=0$
$x=5 \quad x=-2$
$x=\{-2,5\}$

(2)

(Total 4 marks)

3. Let $f(x) = 2x^2 + 4x - 6$.

(a) Express $f(x)$ in the form $f(x) = 2(x - h)^2 + k$.

$y+6+2(1)=2(x^2+2x+1)$
$y+8=2(x+1)^2$
$y=2(x+1)^2-8$

(3)

(b) Write down the equation of the axis of symmetry of the graph of f.

$x=-1$

(1)

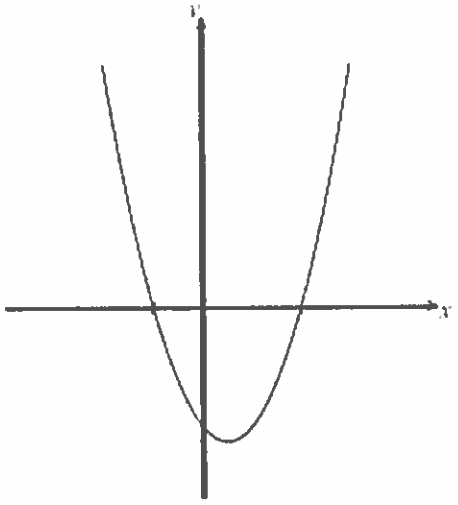
(c) Express $f(x)$ in the form $f(x) = 2(x - p)(x - q)$.

$f(x)=2(x^2+2x-3)$
$f(x)=2(x-1)(x+3)$

(2)

(Total 6 marks)

4. The following diagram shows part of the graph of f, where $f(x) = x^2 - x - 2$.



$0 = x^2 - x - 2$

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

(a) Find both x-intercepts.

$x = \{-1, 2\}$ **(4)**

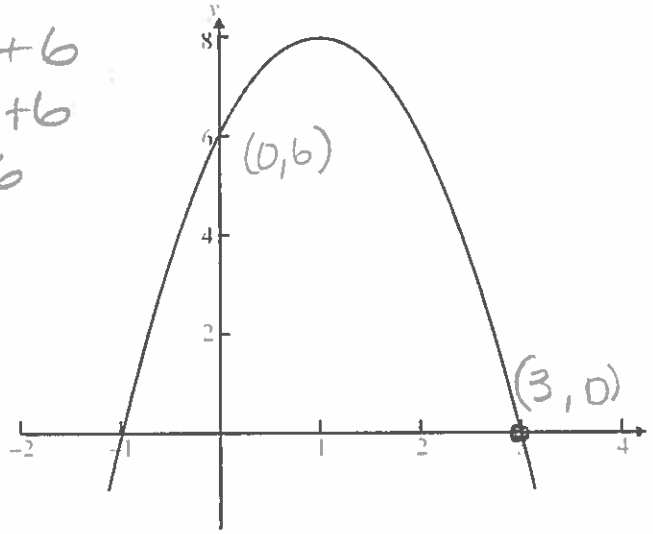
(b) Find the x-coordinate of the vertex.

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

$\boxed{x = \frac{1}{2}}$

(Total 6 marks)

5. The figure below shows part of the graph of a quadratic function $y = ax^2 + 4x + c$.



(a) Write down the value of c.

$\boxed{c = 6}$

(b) Find the value of a.

$y = ax^2 + 4x + 6$

$0 = a(3)^2 + 4(3) + 6$

$0 = 9a + 12 + 6$

$0 = 9a + 18$

$-18 = 9a$

$-2 = a$

$\boxed{a = -2}$

(c) Write the quadratic function in its factorized form.

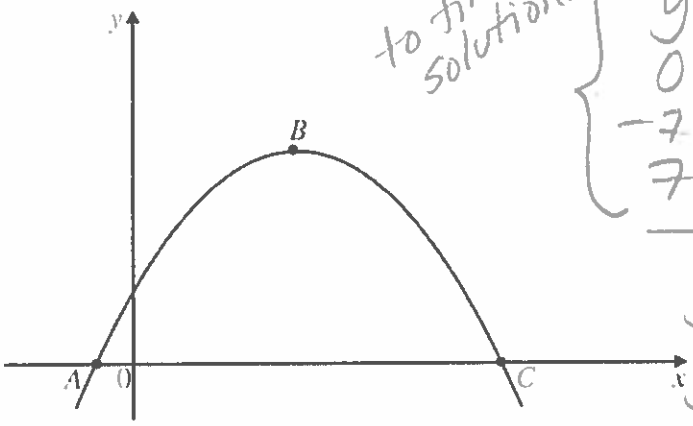
$y = -2x^2 + 4x + 6$

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

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

(Total 8 marks)

6. The diagram shows the parabola $y = (7 - x)(1 + x)$. The points A and C are the x-intercepts and the point B is the maximum point.



Find the coordinates of A, B and C.

to find solutions

$y = (7-x)(1+x)$

$0 = 7 - x$ $\quad -7 = -x$ $\quad 7 = x$

$0 = 1 + x$ $\quad -1 = x$

$A = (-1, 0)$

$B = (3, 16)$

$C = (7, 0)$

$y = 7 + 7x - x - x^2$

$y = -x^2 + 6x + 7$

axis of symmetry $x = \frac{-6}{2(-1)}$

$x = \frac{-6}{-2}$ $\quad x = 3$

plug back $y = -(3)^2 + 6(3) + 7$

$y = -9 + 18 + 7$

$y = 16$

The height h (in feet) of a golf ball t seconds after it leaves the ground is modeled by

$h(t) = -16(t-2)^2 + 76.$

a. Find the maximum height of the golf ball. Explain your answer using mathematical evidence and academic vocabulary from the quadratics unit.

76 feet. (Answers will vary.)

b. How many seconds after the golf ball leaves the ground does it reach its maximum height? Explain your answer using mathematical evidence and academic vocabulary from the quadratics unit.

2 seconds (Answers will vary.)

c. Expand the equation given above and express it in standard form.

$h(t) = -16(t^2-4t+4)+76$

$h(t) = -16t^2+64t-64+76$

$h(t) = -16t^2+64t+12$

/8

d. After exactly how many seconds does the golf ball return to the ground? Express your answer in fully simplified, exact terms.

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

$$x = \frac{-64 \pm \sqrt{64^2 - 4(-16)(12)}}{2(-16)}$$

$$x = \frac{-64 \pm \sqrt{4096 + 768}}{-32}$$

$$x = \frac{-64 \pm \sqrt{4864}}{-32}$$

$\sqrt{4864} = \sqrt{2^8 \cdot 19} = 2^4\sqrt{19}$ or $16\sqrt{19}$

2 | 2432
2 | 1216
2 | 608
2 | 304
2 | 152
2 | 76
2 | 38
19 | 2

$$x = \frac{-64 \pm 16\sqrt{19}}{-32}$$

$$x = \frac{-4 \pm \sqrt{19}}{-2}$$

or

$$x = \left\{\frac{4 \pm \sqrt{19}}{2}\right\} \text{ OR } x = \{-0.18, 4.18\}$$

e. Was the golf ball struck from ground level? Explain your answer using mathematical evidence and academic vocabulary from the quadratics unit.

No!

Answers will vary.