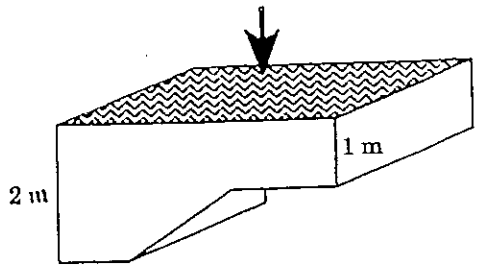
ST GEORGE

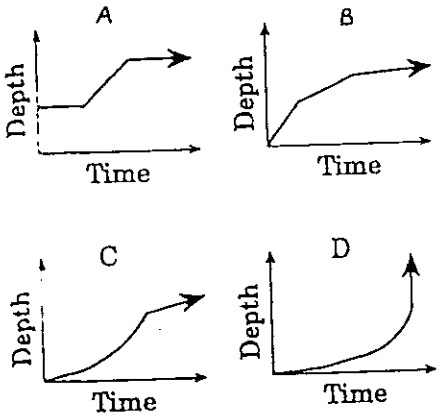
YEAR 10 Topic Test - Further Algebra - GIRLS H.S. Name:

Q1:

A swimming pool is being filled at a constant rate.

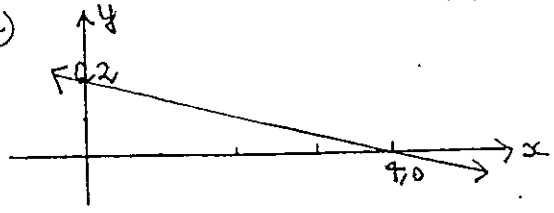


Which graph best represents the depth of water in the pool as it fills?

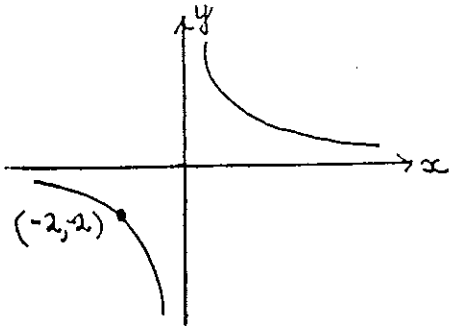


Q2: Find the equations of the following graphs:

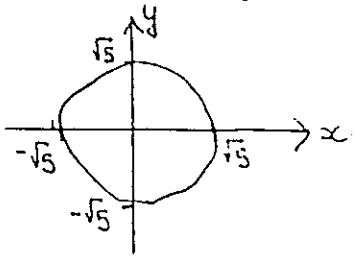
a)



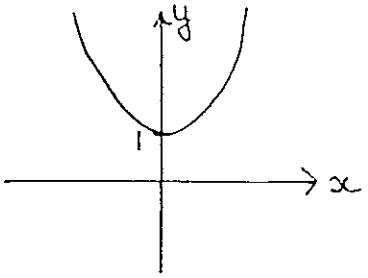
b)



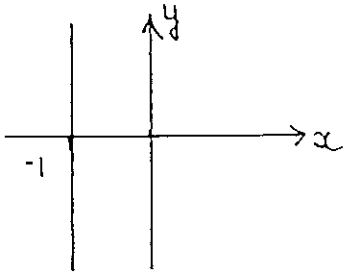
(c)



(d)

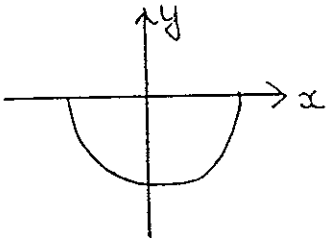


(e)

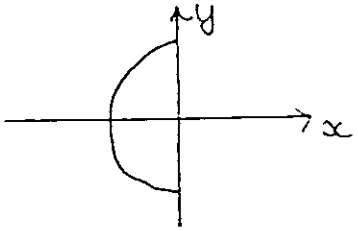


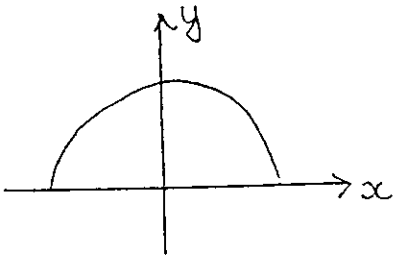
Q3. The graph of $y = \sqrt{64 - x^2}$ is:

A

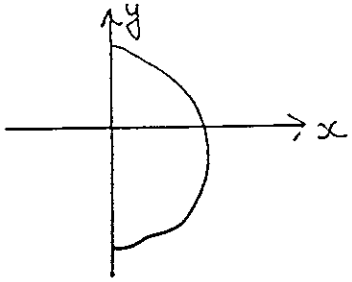


B





D



Q4

a) If $x = 2at$ find an expression for $x^2 - (at)^2$

b) Make y the subject of $A = \frac{x}{6}(x+y)$

Q5. Factorise the following:

a) $18a^2b^4 - 30b^3$

b) $80x^2 - 5y^2$

c) $a^2 + 12ac - 28c^2$

14, -2

d) $12xy - 9x - 16y + 12$

e) $x^2 + 2ax + a^2 - b^2$

f) $b^3 - 8$

g) $x^6 - 7x^3 - 8$ let $y = x^3$

Q6:

a) Solve the following quadratic equations by COMPLETING THE SQU
(Give exact answers)

i) $a^2 + 7a + 7 = 0$

ii) $3x^2 + 6x - 5 = 0$

b) Solve by factorizing

i) $x^2 - 3x - 18 = 0$

ii) $4t^2 + 9 = 15t$

c) Solve by using the QUADRATIC FORMULA. (Give answers correct to one decimal place)

i) $c^2 - 6c + 2 = 0$

ii) $5x^2 + 13x - 6 = 0$

Q7: a) Without graphing find the point of intersection of:

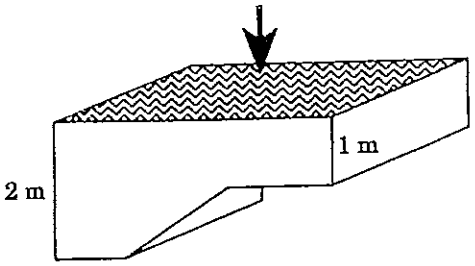
$y = x^2 + 6x - 2$ and $y = 2x + 3$

b) What positive integer, when increased by 20, will be equal to its square.

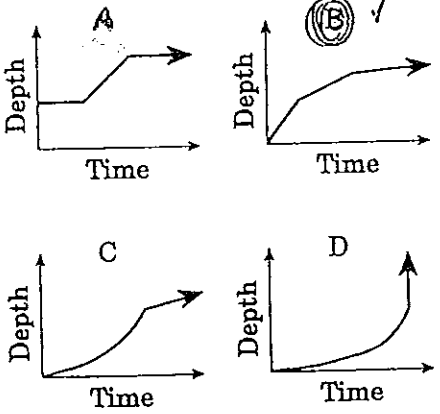
YEAR 10 Topic Test - Further Algebra 59/42 = 93% SOLUTIONS Name: Angelina Tjokrowidjaja

Q1:

A swimming pool is being filled at a constant rate.

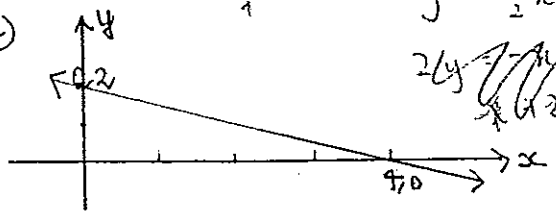


Which graph best represents the depth of water in the pool as it fills?

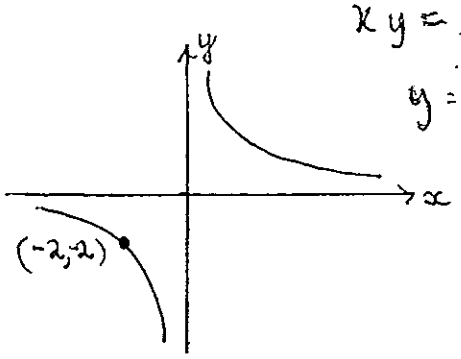


(B) ✓ 1

Q2: Find the equations of the following graphs:

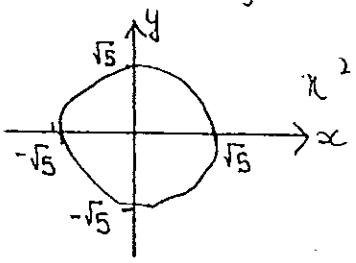
a) 

$y = -\frac{1}{2}x + 2$ ✓ 3

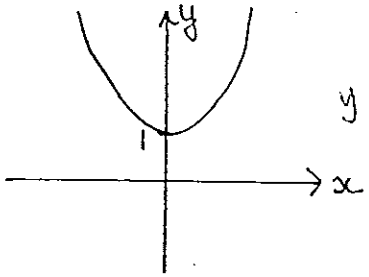
b) 

$xy = 4$ ✓

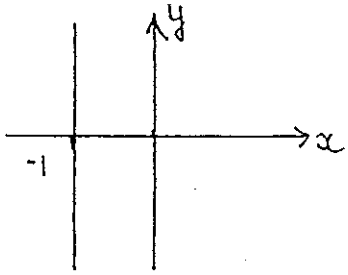
$y = \frac{4}{x}$ ✓

(c) 

$x^2 + y^2 = 5$ ✓

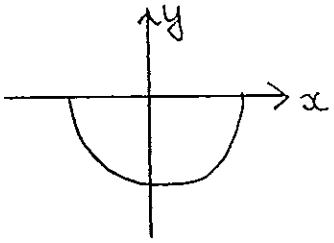
(d) 

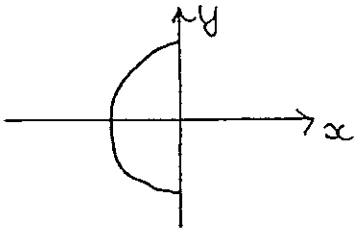
$y = x^2 + 1$ ✓ 3

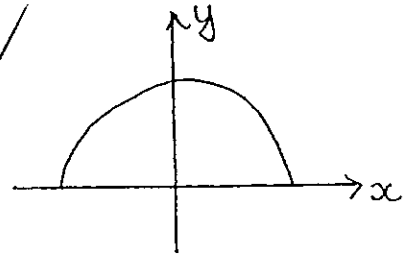
(e) 

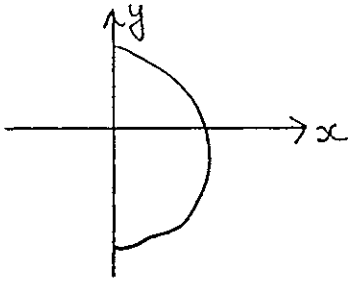
$y = -1$ ✓

Q3. The graph of $y = \sqrt{64 - x^2}$ is:

A 

B 

(C) ✓ 

D 

(8)

Q4

a) If $x = 2at$ find an expression for $x^2 - (at)^2$

$(2at)^2 - (at)^2 = 4a^2t^2 - a^2t^2$

$3a^2t^2$ ✓2

b) Make y the subject of $A = \frac{x}{6}(x+y)$

$6A = x(x+y)$

$\frac{6A}{x} = x+y$ ✓ $y = \frac{6A}{x} - x$ 2

$\frac{6A}{x} - x = y$

Q5. Factorise the following:

a) $18a^2b^4 - 30b^3$ ~~$6b^3(3a^2b - 5)$~~

$= 6b^2(3a^2b^2 - 5b)$ ✓ ∴

b) $80x^2 - 5y^2 = 5(16x^2 - y^2)$

$= 5(4x+y)(4x-y)$ ✓2

c) $a^2 + 12ac - 28c^2$ $[14, -2]$ $(a+14c)(a-2c)$ ✓2

d) $12xy - 9x - 16y + 12$

$3x(4y-3) - 4(4y-3)$

$(3x-4)(4y-3)$ ✓2

e) $x^2 + 2ax + a^2 - b^2$

~~$x(x+2a) + (a+b)(a-b)$~~ 1

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

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

f) $b^3 - 8$ $(b-2)(b^2+2b+4)$ 1½

g) $x^6 - 7x^3 - 8$ let $y = x^3$

$y^2 - 7y - 8 = 0$ 1½

$(y-8)(y+1) = 0$

$\therefore (x^3-8)(x^3+1)$

$(x-2)(x^2+2x+4)(x+1)(x^2-x+1)$

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Q6:

a) Solve the following quadratic equations by COMPLETING THE SQUA (give exact answers)

i) $a^2 + 7a + 7 = 0$

$a^2 + 7a = -7$

$a^2 + 7a + \left(\frac{7}{2}\right)^2 = -7$

$\left(a + \frac{7}{2}\right)^2 = -7 + 12\frac{1}{4}$

$= \frac{21}{4}$

$a + \frac{7}{2} = \pm\frac{\sqrt{21}}{2}$ ✓2

$a = \frac{-7 \pm \sqrt{21}}{2}$

iii) $3x^2 + 6x + 5 = 0$

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

$x^2 + 2x + 1 = -\frac{5}{3}$

$(x+1)^2 = -\frac{5}{3} + 1$

$= -\frac{2}{3}$ ✓

$x + 1 = \frac{\pm\sqrt{-2}}{\pm\sqrt{3}}$ 2. no soluti for x

$x = -1 \frac{\pm\sqrt{2}}{\pm\sqrt{3}}$

b) Solve by factorizing

i) $x^2 - 3x - 18 = 0$ ✓2

$(x+3)(x-6) = 0$

$\therefore x = 6$ or $x = -3$

ii) $4t^2 + 9 = 15t$ $(4t-3)(t-3) = 0$ ✓2

~~$(2t-3)(2t-3) = 15t$~~ $t = 3, \frac{3}{4}$

$4t^2 - 12t - 3t + 9 = 0$ $4t^2 - 15t + 9 = 0$

$4t(t-3) - 3(t-3) = 0$

c) Solve by using the QUADRATIC FORMULA. (give answers correct to one decimal place) $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

i) $c^2 - 6c + 2 = 0$

$\frac{6 \pm \sqrt{36 - 4\times1\times2}}{2}$ ✓2 $\frac{3 \pm \sqrt{9-4\times1\times}}{2}$

$= \frac{6 \pm \sqrt{28}}{2} = 5.6$ or 0.4

ii) $5x^2 + 13x - 6 = 0$.

$\frac{-13 \pm \sqrt{169 - 4\times-6\times5}}{}$

$= \frac{-13 \pm \sqrt{289}}{10} = 0.4$ or -3.0 ✓2.

12

Q7: a) Without graphing find the point of intersection of: x^2+6x-2 s.b. $P-2$

$y = x^2+6x-2$ and $y = 2x+3$

$y = x^2+6x-2$ —— (1)

$y = 2x+3$ —— (2)

(1) - (2): x^2+4x-5

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

$\therefore x = -5, 1$ sub in (2) →

$y = 2(-5)+3$
$= -7$

or

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

$\therefore$ intersection is ✓

$(-5, -7)$ and $(1, 5)$

b) What positive integer, when increased by 20, will be equal to its square.

let positive integer be x

$x+20 = x^2$

$x^2-x-20 = 0$

$(x-5)(x+4) = 0$ 2 ✓

$\therefore$ the positive integer is 5

(4)