

Year 10 - Half yearly 2009

SYDNEY GIRLS H.S

Marks

Marks

Question 1 (17 Marks)

a) Factorise and hence solve

i) $x^2 - 9 = 0$

ii) $a^2 - 2a = 0$

b) Solve $2x^2 + 7x - 15 = 0$

c) Use the quadratic formula to solve (leave answer in exact form).

$2x^2 - 11x + 24 = 0$

d) Mary has 3 children

i) Draw a tree diagram to illustrate all the possible combinations of her children

ii) What is the probability that:

α) Mary has 2 girls

β) Mary has at least 2 girls.

e) Find the simple interest earned on \$8000 invested at 12% p.a. for 4 years.

Question 2 (17 Marks)

a) Three cards are marked 1, 2 and 3. One card is selected and then returned, another card is then selected.

i) Draw a tree diagram to illustrate all possibilities.

ii) Find the probability that both cards show the same number.

iii) Find the probability that both cards are different.

b) Find the compound interest earned on \$21400 invested at 7.5% p.a. for 5 years.

c) Sketch the following curves showing all relevant points.

i) $x^2 + y^2 = 9$

ii) $xy = -2$

iii) $y = 3^x$

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

2

2

3

3

2

1

2

2

2

1

2

3

2

2

2

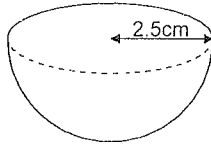
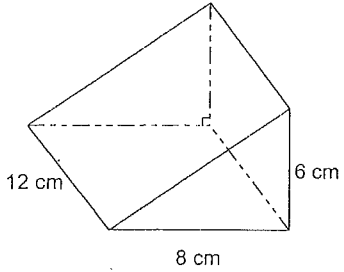
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Question 3 (17 Marks)

- a) A positive integer, when increased by 30 is 12 less than its square.
 i) Form a quadratic equation
 ii) Find the positive integer

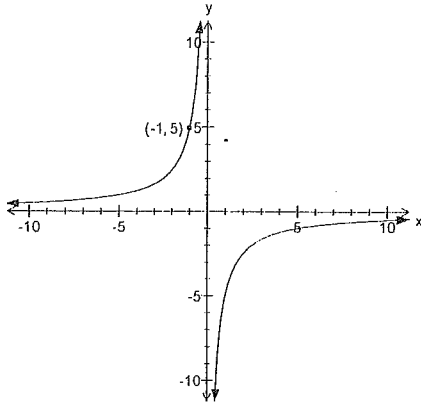
- b) Find the surface area of each solid (correct to 2 decimal places).

- i)  ii) Closed Hemisphere



- c) A parabola has a vertex $(-3,0)$ and y -intercept equal to 2. Find its equation.

- d) Write the equation of the given graph?(show all working out)



Marks

1
3

4
3

3
3

Question 4 (17 Marks)

- a) Using the formula $D = ut + \frac{1}{2}at^2$

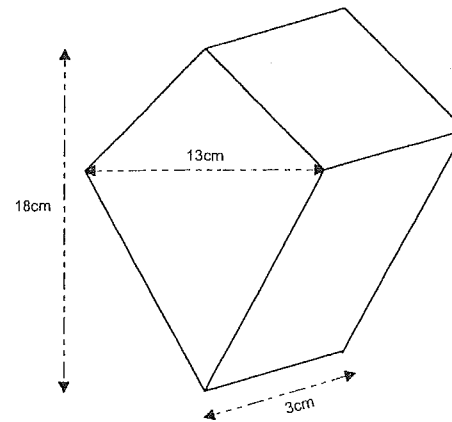
Find the positive value of t if $u = 4, a = 10$ and $D = 9$

- b) Find the value of a car after 4 years if its original value is \$35000 and it depreciates at a rate of 3.2% per year.

- c) For the parabola $y = 2x^2 - 8x - 10$. Find:

- i) The equation of the axis of symmetry
 ii) The co-ordinates of the vertex
 iii) The x and y intercepts
 iv) The minimum value or the maximum value.(state whether Max./Min.)

- d) Find the volume of the following solid (correct to 3 significant figures).



Marks

3

2

2

2

3

2

3

Question 5 (17 Marks)

a) In a class of 30 girls all students study History or Geography or both.

If 16 study History and 18 study Geography and one student is selected at random,

find

- i) The probability that she studies both subjects
- ii) The probability that she studies only Geography
- iii) The probability that she studies either History or Geography but not both.

b) What sum of money must I invest today at 6% p.a. compounded monthly if it is to amount to \$20000 in 10 years time?

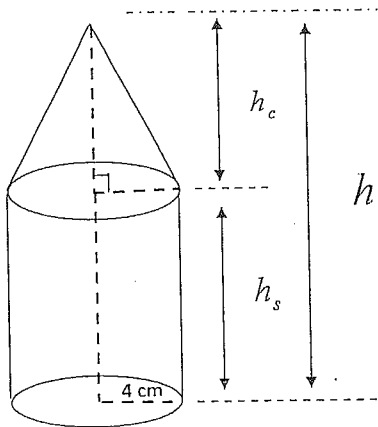
c) If a cone is to have a volume of 6π units³ and radius of 2 cm find the slant height of the cone in exact form.

d) In the solid below the height h_c (the height of the cone) and the height h_s (the height of the cylinder) are in the ratio $h_c : h_s = 1 : 3$.

i) Explain why $h_c = \frac{1}{4}h$ and $h_s = \frac{3}{4}h$

ii) Show that the total volume of the solid

is $\frac{40}{3}\pi h$ cm³.



Yr 10 2009 Q1

a) i) $(x-2)(x+2) = 0$

$x = 2$ or -2

ii) $a(a-2) = 0$

$a = 0$ or 2

b) $2x^2 + 10x - 3x - 15 = 0$

$2x(x+5) - 3(x+5) = 0$

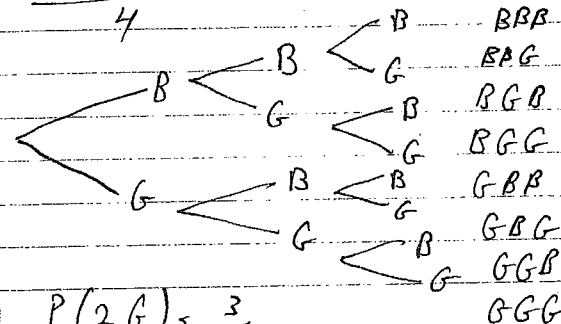
$(x+5)(2x-3) = 0$

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

c) $x = \frac{11 \pm \sqrt{121 - 4 \times 2 \times 24}}{4}$

$= \frac{11 \pm \sqrt{-71}}{4}$ no solution

d)



i) $P(2G) = \frac{3}{8}$

ii) $P(\text{at least 1G}) = \frac{1}{2}$

e)

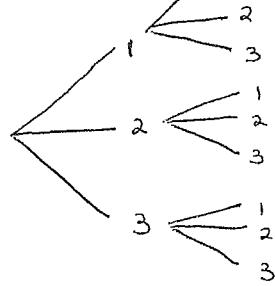
$I = 8000 \times \frac{12}{100} \times 4$

$= \$3840$

Question 2 (17 marks)

1000 10

a) i)



11	1	✓	6	✓
12	2	✓	7	✓
13	3	X	8	✓
21	4	✓	9	✓
22	5	X	10	✓
23				
31				
32				
33				

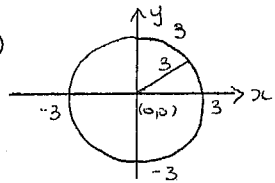
ii) $P(\text{same number}) = \frac{3}{9}$
 $= \frac{1}{3}$ 1

iii) $P(\text{different}) = \frac{2}{3}$ 2

b) Compound Amount = $P(1+r)^n$
 $= 21400 \left(1 + \frac{7.5}{100}\right)^5$
 $= \text{₹ } 30722.47$

\therefore Interest = $\text{₹ } 30722.47 - \text{₹ } 21400$
 $= \text{₹ } 9322.47$ 3

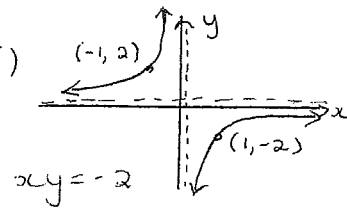
c) i)



$x^2 + y^2 = 9$

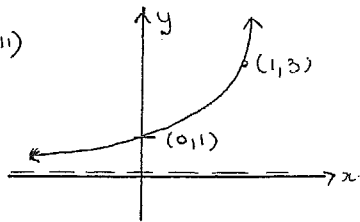
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ii)



2

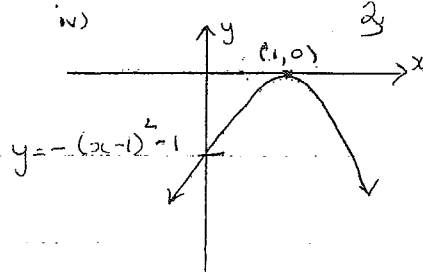
iii)



$y = 3^x$

2

iv)



2

Question 3

a) i) let the integer be x

$x + 30 = x^2 - 12$

ii) $x + 30 = x^2 - 12$

$x^2 - x - 42 = 0$

$(x-7)(x+6) = 0$

$\therefore x = 7$ or $x = -6$

However since we are looking for a positive integer, $x = 7$.

b) i) S.A. = $\frac{1}{2} \times 2 \times 6 \times 8 + 6 \times 12 + 12 \times 8 + 12 \times 10$

$= 48 + 72 + 96 + 120$

$= 336 \text{ cm}^2$

ii) S.A = $3\pi r^2$

$= 3 \times \pi \times 2.5^2$

$= 58.90 \text{ cm}^2$

c) $y = ax^2 + bx + 2$

$-\frac{b}{2a} = -3$

$b = 6a$

$\therefore y = ax^2 + 6ax + 2$

Substitute (3, 0)

$0 = 9a - 18a + 2$

$a = \frac{2}{9}$

$\therefore y = \frac{2}{9}x^2 + \frac{4}{3}x + 2$

d) $y = \frac{k}{x}$

$5 = \frac{k}{-1}$

$k = -5$

$\therefore y = -\frac{5}{x}$

Year 10: Question Four: (17 Marks)

a) $D = ut + \frac{1}{2}at^2$
 $9 = 4t + \frac{1}{2} \times 10t^2$
 $0 = 5t^2 + 4t - 9$
 $0 = (t-1)(5t+9)$
 $\therefore t = 1$ or $t = -\frac{9}{5}$ ✓✓

But $t > 0 \therefore t = 1$ ✓

b) $A = P(1+r)^n$
 $= 35000(1+0.032)^4$ ✓
 $= 35000(0.968)^4$
 $= \$30730.49$ ✓

c) i) axis of symmetry: $x = -\frac{b}{2a} = \frac{8}{4} = 2 \therefore x = 2$ ✓✓

ii) vertex: $(2, 2(2)^2 - 8(2) - 10) = (2, -18)$ ✓✓

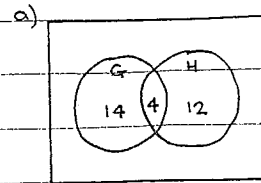
iii) When $x = 0$: $y = -10$ ✓

When $y = 0$: $x = -1.5$ ✓✓

iv) $y = -18$ ✓ is a minimum value ✓

d) $V = \left(\frac{1}{2} \times 13 \times 18\right) \times 3$ ✓✓
 $= 351 \text{ cm}^3$ (to 3 sig figs) ✓

Question 5:



i) $P(\text{both}) = \frac{4}{30}$
 $= \frac{2}{15}$

ii) $P(\text{Geog. only}) = \frac{14}{30}$
 $= \frac{7}{15}$ ①

iii) $P(\text{one only}) = 1 - \frac{2}{15}$
 $= \frac{13}{15}$ ②

b) $A = 20000$	$A = P(1+r)^n$
$r = 0.06 \div 12$	$20000 = P(1.005)^{120}$
$= 0.005$	$P = \frac{20000}{1.005^{120}}$
$n = 10 \times 12$	$= 10992.65467...$
$= 120$	

\therefore Approx. \$10992.65 needs to be invested (nearest cent). ③

c) $V = \frac{1}{3}\pi r^2 h$
 $6\pi = \frac{1}{3} \times \pi \times 2^2 \times h$
 $h = \frac{9}{2} \text{ cm}$

$s^2 = \left(\frac{9}{2}\right)^2 + 2^2$
 $= \frac{81}{4} + 4$
 $= \frac{97}{4}$
 $s = \frac{\sqrt{97}}{2}$ (as $s > 0$) ④

② d) $h_c : h_s = 1 : 3$

$\therefore h_c : h = 1 : 4$

So $h_c = \frac{1}{4}h$

$h_s : h = 3 : 4$

So $h_s = \frac{3}{4}h$ ③

ii) $V = \frac{1}{3}\pi r_c^2 h_c + \pi r_s^2 h_s$
 $= \frac{1}{3} \times \pi \times \left(\frac{1}{4}h\right)^2 \times \left(\frac{1}{4}h\right) + \pi \times \left(\frac{3}{4}h\right)^2 \times \left(\frac{3}{4}h\right)$
 $= \frac{4\pi h^3}{8} + 12\pi h^3$
 $= \frac{40\pi h^3}{3} \text{ cm}^3$ ③