



ST STEPHEN'S SCHOOL

SEMESTER TWO EXAMINATION 2003

YEAR 10 MATHEMATICAL DEVELOPMENT

Name _____

TIME ALLOWED FOR THIS PAPER

Working time for the paper:

2 hours

Reading time:

10 minutes

MATERIAL REQUIRED/RECOMMENDED FOR THIS PAPER

TO BE PROVIDED BY THE SUPERVISOR

- This Question and Answer Booklet containing 19 questions and 16 pages and consisting of 2 sections.

TO BE PROVIDED BY THE CANDIDATE

Standard items: Pens, pencils, eraser, ruler.

Special items: Drawing instruments, templates and a calculator satisfying the conditions set by the Curriculum Council.

1 A4 sized page of handwritten notes, front and back.

INSTRUCTIONS TO CANDIDATES

ALL questions must be attempted

You may answer the questions in any order you wish, provided that you answer them in the space provided in this Question and Answer Booklet. If you require additional space there are blank pages at the end of the Booklet but you must refer to this extra working with the original answer, then clearly number the question on the back pages. Additional work may be done on file paper, but name all these sheets and the graph page.

TOTAL MARKS FOR THE PAPER: 125

Show all working clearly, in sufficient detail to allow answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.

SECTION A**NAME:** _____

1 [4 marks]

Solve $2x^2 + 4x - 5 = 0$ using the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

2 [4 marks]

a) Circle the correct answer:

In turning point form, the quadratic equation $y = x^2 - 8x + 18$ can be written as:

A $y = (x - 4)^2 + 34$

B $y = (x + 4)^2 + 2$

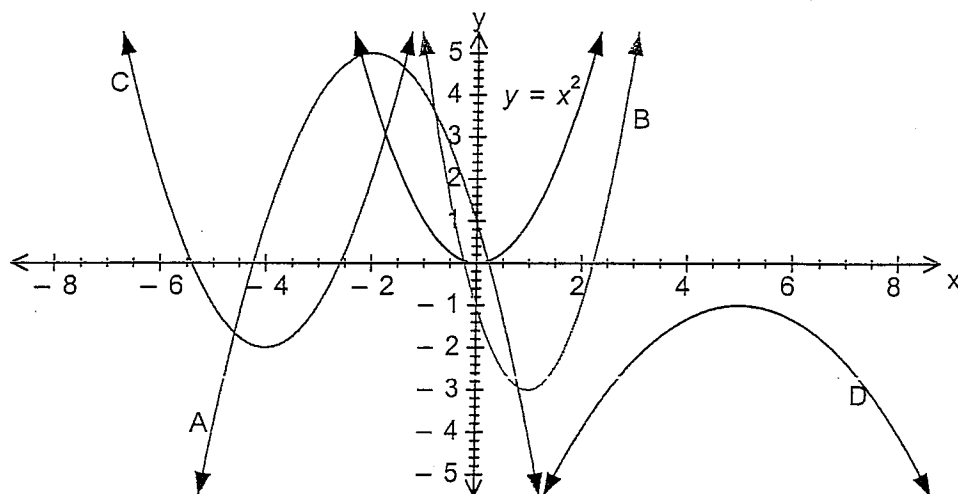
C $y = (x - 4)^2 - 2$

D $y = (x + 4)^2 - 2$

E $y = (x - 4)^2 + 2$

b) Hence write down the coordinates of the turning point for the parabola
 $y = x^2 - 8x + 18$

3 [8 marks]



Circle the correct answer:

a) The equation of parabola A is:

A $y = (x+2)^2 + 5$

B $y = (x-2)^2 + 5$

C $y = -(x+2)^2 + 5$

D $y = -(x-2)^2 + 5$

E $y = -(x+2)^2 - 5$

b) The equation of parabola B is:

A $y = 2(x-1)^2 - 3$

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

C $y = -2(x-1)^2 - 3$

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

E $y = \frac{1}{2}(x-1)^2 - 3$

c) The equation of parabola C is:

A $y = (x-4)^2 - 2$

B $y = (x+4)^2 - 2$

C $y = (x-4)^2 + 2$

D $y = (x+4)^2 + 2$

E $y = -(x-4)^2 + 2$

d) The equation of parabola D is:

A $y = 3(x-5)^2 - 1$

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

C $y = -3(x-1)^2 - 5$

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

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

4 [12 marks] Determine the relationship between y and x for each of the following

a)

x	0	1	2	3	4
y	3	5	7	9	11

b)

x	0	1	2	3	4
y	-2	2	14	34	62

c)

x	1	2	3	4
y	24	12	8	6

d)

x	0	1	2	3	4
y	5	10	20	40	80

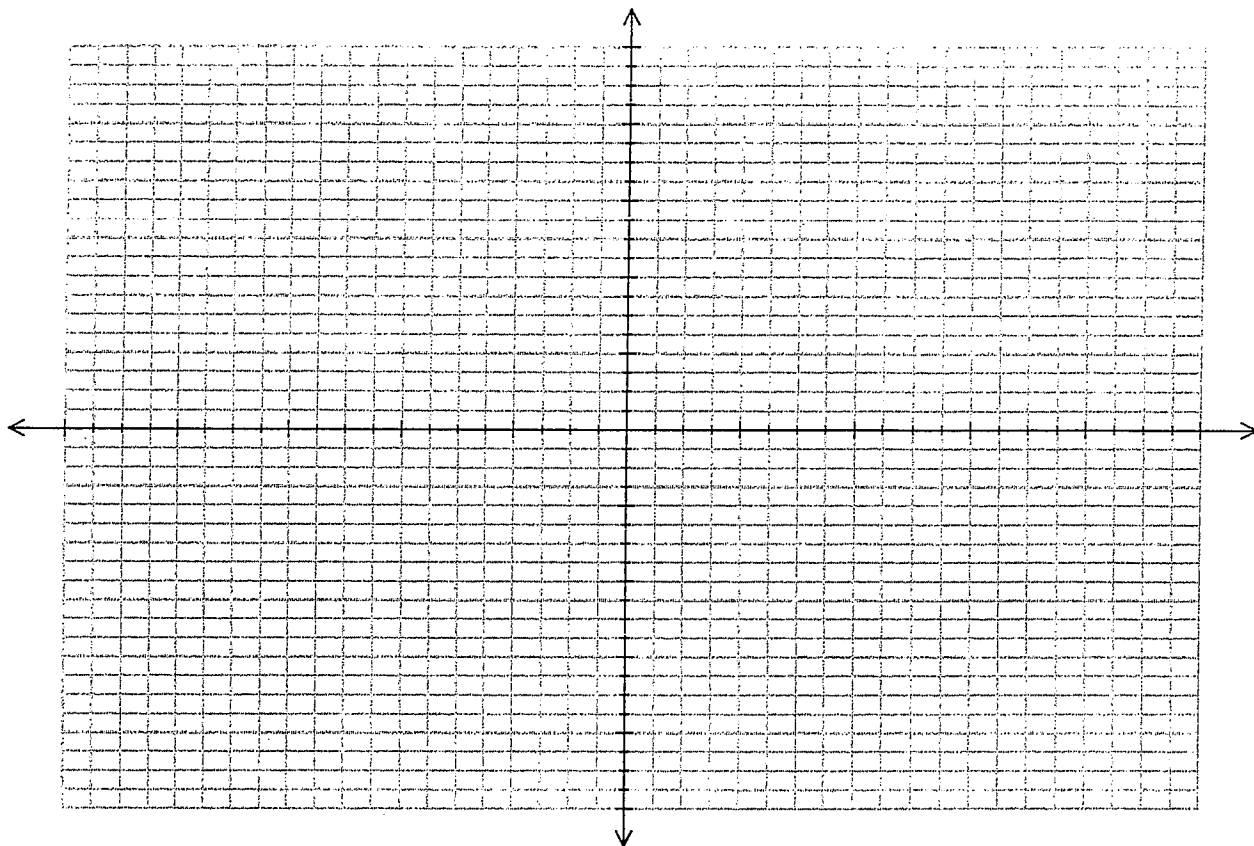
e)

x	1	2	0	-1	-2
y	-1	1	-3	-5	-7

5 [7 marks]

a) Sketch the graphs of the following:

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



b) Using your graph, find the solution to the equations

i) $-2 \times 3^x = \frac{-6}{x}$

ii) $\frac{-6}{x} = 3$

6. [15 marks – 2, 2, 3, 3, 3, 2]

Completely factorise the following:

a) $9m^2 - 25n^2$

b) $x^2 + 9x - 36$

c) $12x^2 + 2x - 24$

d) $6x^3 + 3x^2 - 3x$

e) $x^2 - y^2 + 5x - 5y$

f) $(j-b)^2 - 16$

7. [7 marks – 3, 4]

Express the following as a single fraction in simplest form.

a) $\frac{3}{x-5} - \frac{2}{x+4}$

b) $\frac{7}{(5x-2)(x-6)} + \frac{2}{x^2-2x-4}$

8. [7 marks – 3, 4]

Simplify the following expressions:

a) $\frac{x^2-5x}{3x+3} \times \frac{x+1}{2x^2+6x}$

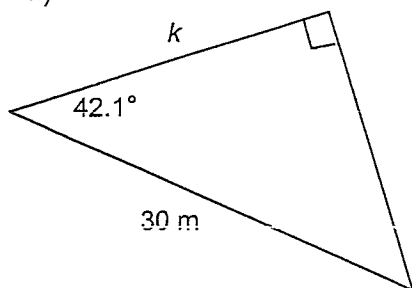
b) $\frac{x^2-16}{x^2+2x-3} \div \frac{x^2+2x-8}{x^2+6x-7}$

SECTION B**NAME:** _____

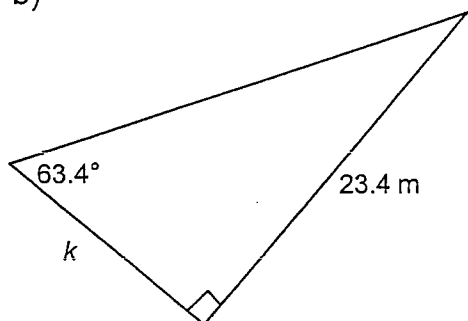
9. [4 marks]

Find the value of k in these triangles to two decimal places.

a)



b)



10. [6 marks]

Find the value of θ for the domain indicated.

a) $\cos \theta = 0.74$

$0^\circ \leq \theta \leq 360^\circ$

b) $\sin \theta = 0.4609$

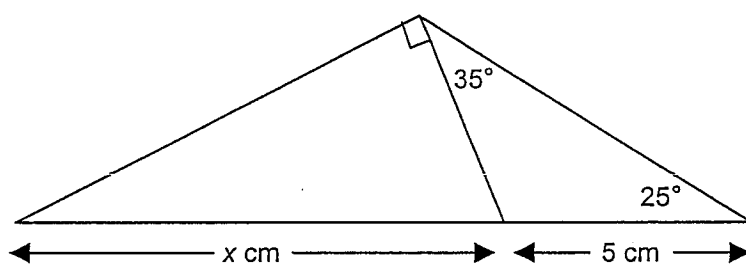
$90^\circ \leq \theta \leq 180^\circ$

c) $\tan \theta = -2.645$

$0^\circ \leq \theta \leq 360^\circ$

11. [4 marks]

Solve for the variable in the diagram:



12. [3 marks]

What is the size of the largest angle in a triangle that has sides of length 5 cm, 6 cm and 9 cm?

13. [3 marks]

A lifeguard on watch at a beach spots a shark at an angle of depression of 29° . If the lifeguard views the shark from a height (to his eye-level) of 16 m above sea-level, find the horizontal distance between the lifeguard and the shark, correct to two decimal places.

14. [7 marks]

A hiker walks 5 km on a true bearing of 025° from camp-site A to camp site B. All distances are to be rounded to two decimal places.

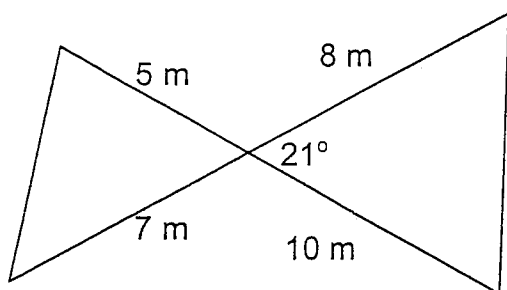
a) How far east has she walked?

She then continues another 6 km on a true bearing of 078° from camp site B to camp site C.

b) How far east of camp B is she now?

c) Calculate the distance between Camp A and Camp C

15. [4 marks]

Find the area enclosed by the figure (to the nearest m^2)

16. [3 marks]

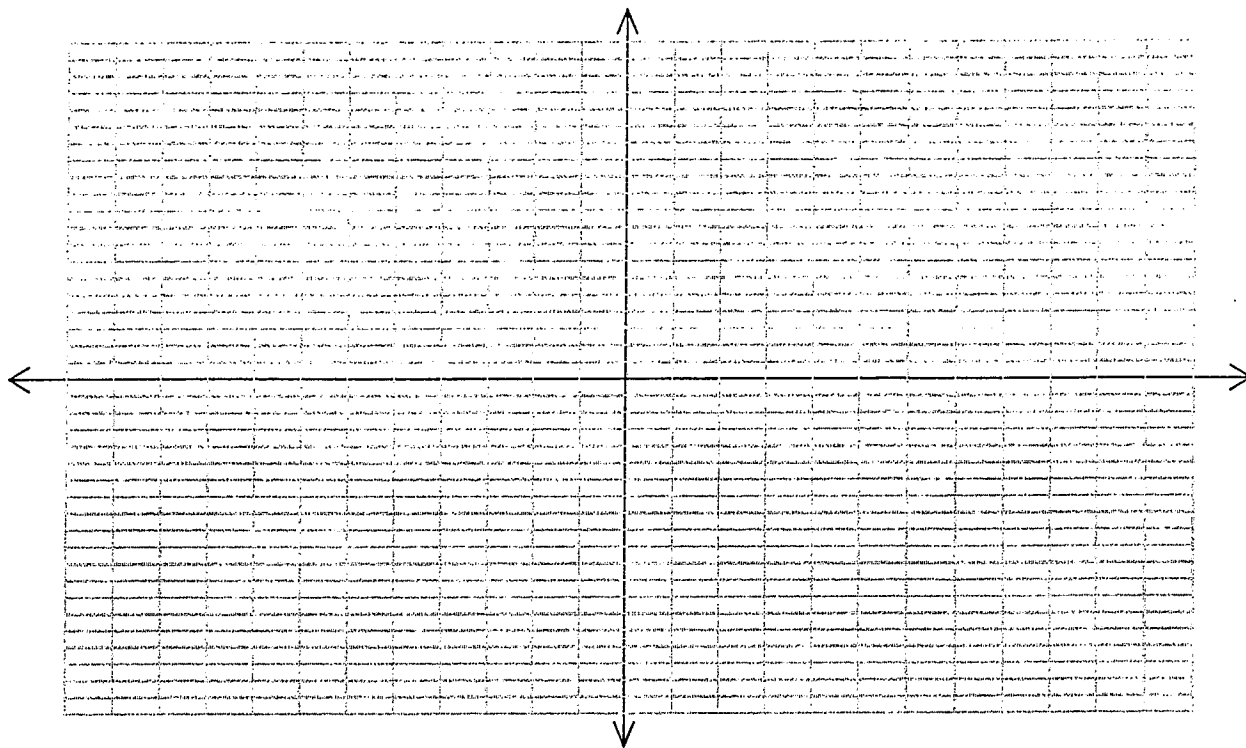
A box contains 15 blocks. Seven are red, five are white and the rest are blue. A block is chosen at random from the box. Find the probability that the block chosen is:

a) blue _____

b) not red _____

c) red or blue _____

17. [9 marks]

Sketch the graph of $y = \cos \theta$ for the domain $-360^\circ \leq \theta \leq 360^\circ$ 

From the graph, solve:

a) $\cos \theta = -0.6$

b) $\cos \theta = 0.2$

c) Give the values of θ when $y < 0$.

18. [10 marks]

In a chess tournament, each contestant must play three others. Mike estimates that he has an equal chance of winning or losing each game.

- a) Draw a tree diagram and list the sample space for the possible outcomes of Mike's three games.

b) How many possible outcomes are there? _____

c) What is the probability of Mike: _____

i) winning all three games? _____

ii) winning only one game? _____

iii) winning the first game? _____

iv) not winning the third game? _____

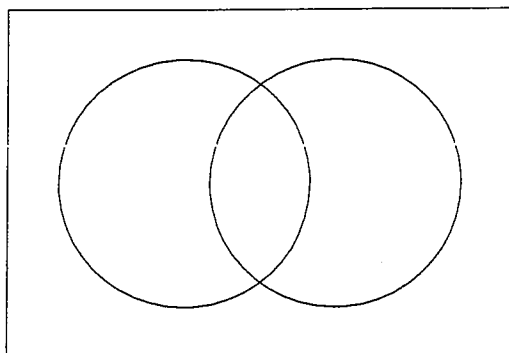
v) winning at least two games? _____

vi) not winning the first two games? _____

19. [8 marks]

A shopkeeper found that, out of his first 20 customers, 13 bought milk and 15 bought a newspaper. Four customers did not buy either milk or a newspaper.

a) Represent this information on the Venn diagram



b) How many customers bought both milk and newspaper? _____

c) Find the probability that a customer, chosen at random from the first 20:

- | | | |
|------|---------------------------|-------|
| i) | buys milk only | _____ |
| ii) | buys milk and a newspaper | _____ |
| iii) | buys milk or a newspaper | _____ |
| iv) | does not buy a newspaper | _____ |

END OF EXAMINATION