NORTH SYDNEY GIRLS HIGH SCHOOL . YEAR 10 MATHEMATICS. TERM 4 2002

PART A: (25 MARKS) MULTIPLE CHOICE QUESTIONS. CHOOSE ONE ANSWER.

1. The probability of selecting a ten of spades from a deck of 52 well-shuffled cards is

   A $\frac{1}{52}$. C $\frac{12}{52}$.

   B $\frac{3}{52}$. D $\frac{51}{52}$.

2. When a card is drawn at random from a full pack of 52 cards, the probability of drawing a spade is

   A $\frac{1}{4}$. C $\frac{1}{52}$.

   B $\frac{1}{13}$. D $\frac{1}{2}$.

3. A card is drawn at random from a standard pack of 52 playing cards. What is the probability of drawing a red card or an ace?

   A $\frac{2}{52}$ C $\frac{28}{52}$.

   B $\frac{26}{52}$ D $\frac{30}{52}$

4. A card is drawn at random from a standard pack of 52 playing cards. What is the probability of drawing neither a red card nor an ace?

   A $\frac{22}{52}$ C $\frac{26}{52}$

   B $\frac{24}{52}$ D $\frac{48}{52}$

5. Assuming that, in a very large sample of women who have only two children, the probability of having a girl is the same as the probability of having a boy, what is the probability that a mother in this group has one girl and one boy?

   A $\frac{1}{4}$ C $\frac{1}{2}$

   B $\frac{1}{3}$ D $\frac{3}{4}$

6. Three fair coins are to be tossed and the outcome observed. What is the probability that the outcome will be 2 heads and 1 tail?

   A $\frac{1}{8}$ C $\frac{3}{8}$

   B $\frac{1}{2}$ D $\frac{2}{3}$

7. A pair of unbiased dice is thrown. What is the probability that the sum of the numbers uppermost is 10?

   A $\frac{1}{36}$ C $\frac{3}{36}$

   B $\frac{2}{36}$ D $\frac{10}{36}$

8. In a game called cross-lotto, players arrange in a row, 6 digits chosen (with replacement) from {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}.

To decide the winner, six digits are drawn from a barrel (with replacement). What is the probability of a single entry being correct?

A $\frac{1}{60}$

B $\frac{1}{10^6}$

C $\frac{1}{6^{10}}$

D neither A, nor B, nor C

9. Two counters are drawn from a bag containing 2 purple, 3 blue, and 5 black counters.

The probability of drawing two counters of the same colour is:

A. $\frac{14}{45}$

B. $\frac{1}{2}$

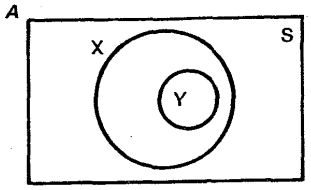
C. $\frac{19}{50}$

D. $\frac{1}{45}$

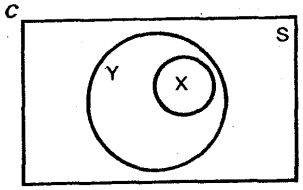
10. X and Y are independent events of the sample space S.

Which one of the following diagrams best illustrates the relationship between X, Y, and S?

A



C



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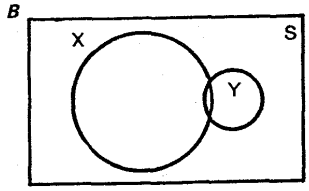
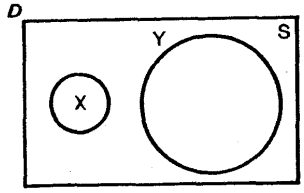


D



11. Which one of the following tables is consistent with y varying directly with x?

A

x	1	2	3	4
y	4	3	2	1

C

x	1	2	3	4
y	3	6	9	12

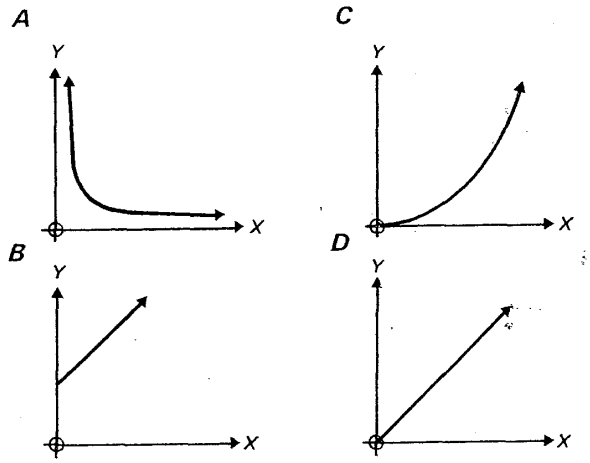
B

x	1	2	3	4
y	1	4	9	16

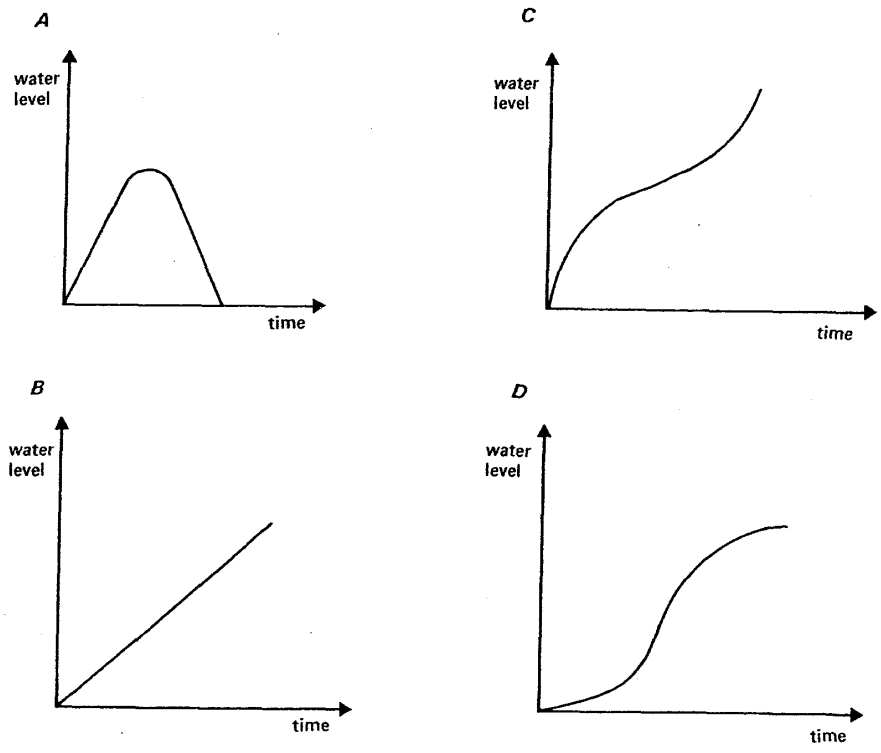
D

x	1	2	3	4
y	1	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$

12. Which one of the following graphs illustrates y varying directly with x?

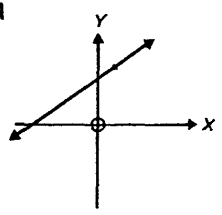


13. Which one of the following graphs best illustrates the change in water depth as a spherical container is being filled with water at a constant rate?

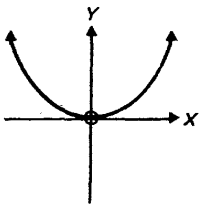


14. Which one of the following graphs could represent the relationship between x and y, where $xy = k$ and k is a constant?

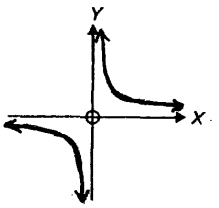
A



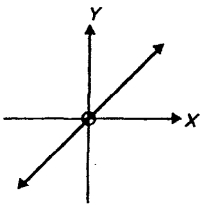
C



B



D



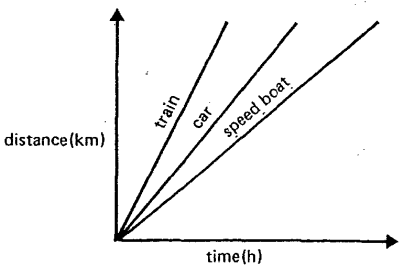
15. In the travel graph, which one of the three forms of transport has the greatest average speed?

A train

B car

C speed boat

D All have the same speed.



16. Which one of the following tables is consistent with y varying inversely with x?

A

x	1	2	3	4
y	4	3	2	1

C

x	1	2	3	4
y	3	6	9	12

B

x	1	2	3	4
y	1	4	9	16

D

x	1	2	3	4
y	12	6	4	3

17.

x	2	4	6	8
y	0	1	2	3

Which one of the following rules describes all of the pairs (x,y) shown in the table?

A $y = \frac{1}{2}x - 1$

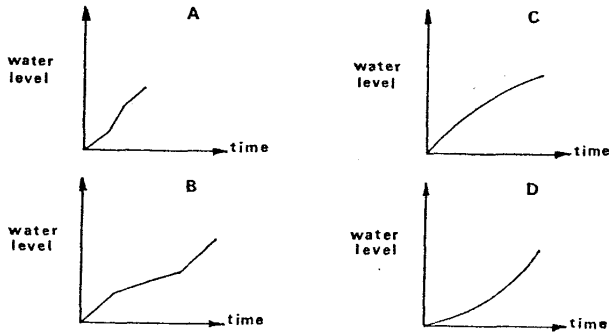
B $2y = x - 1$

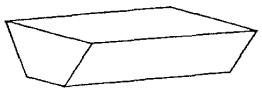
C $y = x - 2$

D $2y = 1 - x$

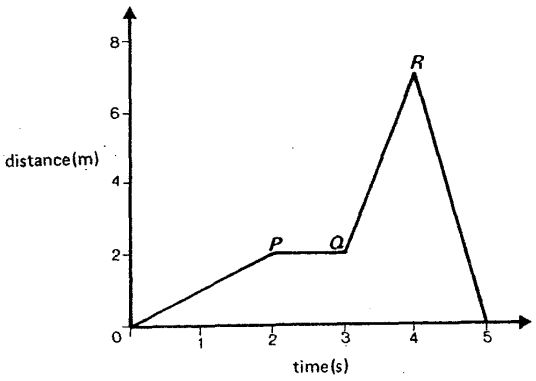
18. The container shown is placed under a tap from which water is flowing at a steady rate.

Select, from the key, the graph which best shows how the water level in the container changes with time if the container is empty at the start.





19. The distance-time graph shown describes the motion of a model train along a straight stretch of track. The train is initially travelling forwards.



Which one of the following statements is <u>false</u>?

A The portion of the graph labelled QR indicates that the train is slowing down.

B The portion of the graph labelled PQ indicates that the train is stationary.

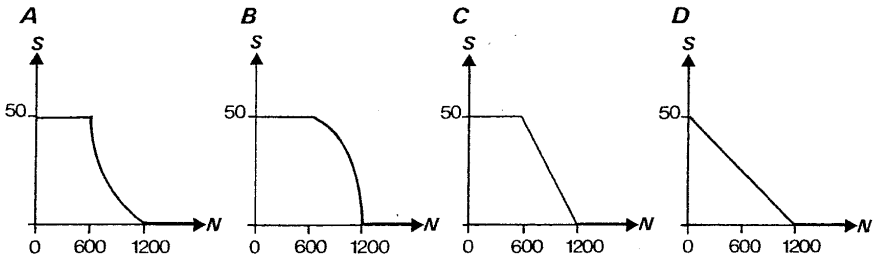
C After 5 seconds the train is back to where it started.

D The speed of the train for the first two seconds is 1 m s^{-1}.

20. A road can carry N cars at an average speed of S km h^{-1}.

The following limits apply:
If the number of cars is greater than 1200, they cannot move and S = 0. If the number is less than 600, S = 50. As the number of cars decreases from 1200 to 600, S uniformly increases from 0 to 50.

The graph representing the relation between S and N is



21. The volume (in cm^3) of a right circular cylinder of base radius 5 cm is directly proportional to its height (in cm). The constant of proportionality is

A 5. C 25π.

B 5π. D $25\pi^2$.

22.

x	1	2	3	4	5	6
y	2	11	26	47	74	107

For $1 \leqslant x \leqslant 6$, x an integer, the function whose rule is illustrated in the table is $y=$

A $3x^2$. C $x^3 + 2x - 1$.

B $x^2 + 6x - 5$. D $3x^2 - 1$.

23. If $P = \frac{2ab + h^2}{2}$, then

A $h^2 = 2P - 2ab$. C $h = 2\sqrt{ab - P}$.

B $h = 2ab - 2P$. D $h = 2\sqrt{P - ab}$.

24. If the formula $P = \pi R(R + k)$ is transformed so that k is the subject, then

A $k = \frac{P}{\pi}$. C $k = \frac{P}{\pi R^2}$.

B $k = P - \pi R - R$. D $k = \frac{P}{\pi R} - R$.

25. Which one of the following can be used to find x from the formula $c = \frac{\sqrt{x}}{d}$?

A $x = c^2d$ C $x = cd^2$

B $x = \sqrt{cd}$ D $x = c^2d^2$

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PART B. SHOW ALL NECESSARY WORKING. (25 MARKS)

QUESTION 1. (6 MARKS)

A rectangular yard has an area of $120\ m^2$.

(i) Draw a table with 6 possible length (ℓ) and breadth (b) measurements for this yard.

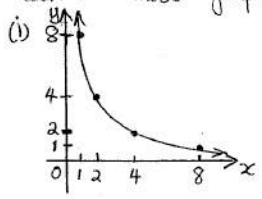
(ii) Graph the relationship between length (ℓ) and breadth (b) on a number plane.

(iii) What type of variation is the relationship between length and breadth?

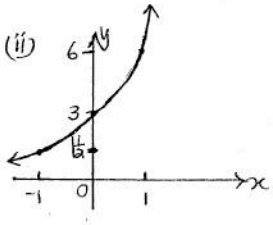
QUESTION 2. (6 MARKS)

By completing a table of values or otherwise, determine the equation for each of these graphs.

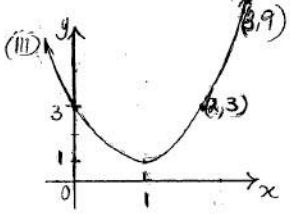
(i)



(ii)



(iii)



QUESTION 3. (2 MARKS)

(i) Factorise: x^2-6x+9

(ii) Hence factorise: $x^2-6x+9-y^2$

QUESTION 4. (4 MARKS)

Three coins are tossed 300 times and the number of heads obtained at each trial is recorded in the table.

Calculate the experimental probability of obtaining:

(i) one head

(ii) one tail

(iii) at least one head.

Number of heads	f
0	30
1	118
2	120
3	32

QUESTION 5. (7 MARKS)

A bag containing 3 green marbles and 2 pink marbles has two marbles drawn from it at random without replacement.

(i) Draw a tree diagram to represent this information and showing all possible outcomes

(ii) Find the probability of obtaining:

a) 2 pink marbles.

b) a green marble followed by a pink marble.

c) no pink marbles

d) a green and a pink marble.

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SOLUTIONS.

PART A /25

1. A
2. A
3. C
4. B
5. C
6. C
7. C
8. B
9. A
10. D
11. C
12. D
13. C
14. B
15. A
16. D
17. A
18. C
19. A
20. C
21. C
22. D
23. A
24. D
25. D

PART B. /75

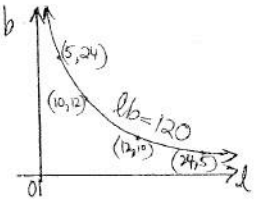
Q1.

(i)

l	120	60	40	30	20	10	5	4	3	2	1	6
b	1	2	3	4	6	12	24	30	40	60	120	15

(3 MARKS)
(ONLY 6 values needed)
(1 off per error)

(ii)



(2 MARKS)
1 Labels/shape.
1 points plotted correctly.

(iii) Inverse (1 MARK)

Q2. (i) $xy=8$ (1 MARK)

(ii) $y = 3.2^x$

(iii) $y=2(x-1)^2+1$
$y= 2x^2-4x+3$

(2 MARKS)
(1 for "3", 1 for "2^x")

(3 MARKS)
(one for each coeff.)

Q3. (i) $(x-3)^2$ (1 MARK)

(ii) $(x-3-y)(x-3+y)$ (1 MARK)

Q4. (i) $P(\text{one head}) = \frac{118}{300}$

$= \frac{59}{150}$ (1 MARK)

(ii) $P(\text{one tail}) = P(\text{2 heads})$

$= \frac{120}{300}$

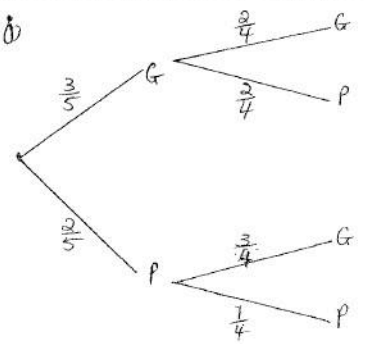
$= \frac{2}{5}$ (1 MARK)

(iii) $P(\text{at least one head}) = 1 - P(\text{no heads})$ or $P(1H)+P(2H)+P(3H) = \frac{270}{300}$

$= 1 - \frac{30}{300}$ $= \frac{9}{10}$ (2 MARKS)

$= \frac{9}{10}$

Q5. (i)



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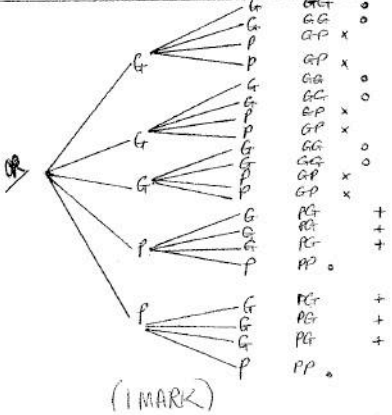

POSSIBLE OUTCOMES

GGG ○
GGP ○
GPP ×
GPP ×
GGP ○
GGG ○
GPP ×
GPP ×
GGP ○
GGG ○
GPP ×
GPP ×
PGG +
PGP +
PGG +
PPP ○
PGG +
PGP +
PGG +
PPP ○

(1 MARK)

(ii) a) $P(PP) = \frac{2}{20} = \frac{1}{10}$ (1 MARK)

b) $P(GP) = \frac{6}{20} = \frac{3}{10}$ (1 MARK)

c) $P(\text{no pink}) = P(GGG)$ $= \frac{6}{20} = \frac{3}{10}$ (2 MARKS)

d) $P(GP \text{ or } PG) = \frac{6}{20} + \frac{6}{20}$ $= \frac{12}{20} = \frac{3}{5}$ (2 MARKS)