



MATHEMATICS

YEAR 8

YEARLY EXAMINATION

2004

Time Allowed: 75 minutes

INSTRUCTIONS:

- There are FIVE (5) Parts: Parts A-E. Each Part is of equal value (20 Marks each).
- Attempt all questions.
- Show all necessary working. Marks may be deducted for badly arranged work or incomplete working.
- Start each Part on a new page.
- Write on one side of paper only.
- Diagrams are NOT to scale.
- Board-approved calculators may be used.
- Write your name and Maths class clearly at the top of each Part and clearly number each question.

PART A (20 Marks) ANSWERS ONLY

MARKS

1. Evaluate the following correct to two decimal places:

(a)  $8\frac{3}{8} + 5\frac{1}{2} \div 2\frac{1}{4}$  1

(b)  $\frac{\sqrt{2.58 + (3.35)^2}}{22.98}$  1

2. Express the following percentages as fractions in their simplest form:

(a) 21% 1

(b) 356% 1

3. Simplify

(a)  $4x - 5 + 3x - 2$  1

(b)  $(3a^3)^2$  1

(c)  $\frac{3g}{5} + \frac{g^2}{15}$  1

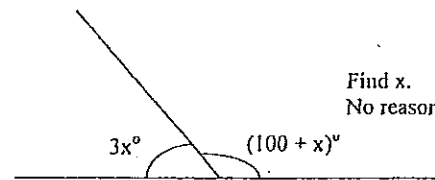
(d)  $5p^3 \times 4p^4$  1

4. Factorise  $3b^3 - 6bc$  1

5. The ratio of apples to oranges is 3:2.

If there are 12 oranges, how many apples are there? 1

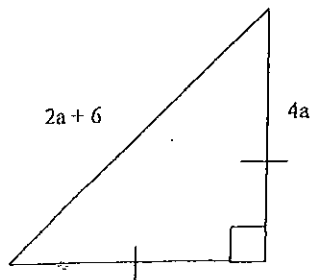
6. 1



Find x.  
No reasoning required

7. Solve  $3x - 5 = 7$  1

8.



Write an expression for

(a) the perimeter of this figure

1

(b) The area of the figure.

1

9. A pieceworker made 120 purses between 9.00 am and 1.00 pm.  
Find her hourly rate of production.

1

10.

Name the part of the circle shown in this diagram



1

11. If  $y = 6 - 2x$  and  $x = -2$  find the value of  $y$ .

1

12. Plot the point  $(2, -3)$  on a number plane

1

13. A bag contains 3 green balls, 2 red balls and 8 blue balls.  
What is the probability of choosing a blue ball?

1

14. What is the mode of the following scores?

5, 3, 4, 6, 5, 6, 4, 5

1

**PART B (20 Marks) SHOW ALL WORKING**

MARKS  
2

1. Convert the following to percentages:

(a) 1.48

(b)  $\frac{6}{63}$

2. A salary of \$26,800 is increased by 4.2%. What is the new salary?

2

3. A clothing store buys a formal dress for \$360 and sells it for \$540.  
Find the percentage profit on the selling price.

2

4. Expand and simplify:

(a)  $3p(2x - 4) + 8p$

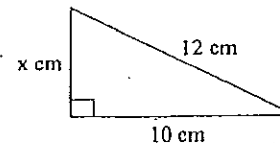
2

(b)  $\left(\frac{2y}{3x}\right)^3 + \frac{y^2}{9x}$

2

5. Find the value of the pronumeral in the following figure:

2



6. (a) Find the rule for the relationship

2

x	-4	-3	-2	-1
y	10	8	6	4

(b) Sketch the graph of this line on the number plane.

2

(c) Does the point  $(2, -6)$  lie on this line? Justify your answer.

2

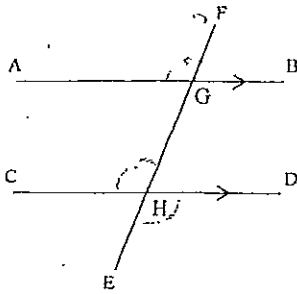
(d) What is the point of intersection of this line with the line  $y = -2$ ?

2

**PART D (20 Marks) SHOW ALL WORKING**

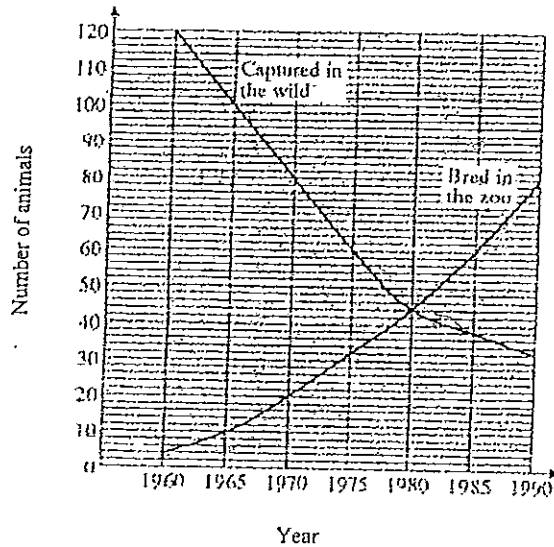
1. Prove that  $\angle AGF = \angle EHD$ .

3



2. All new animals in a zoo are either captured in the wild or bred in the zoo. A zoo began a program to encourage breeding in the zoo.

3



Use the graph to answer the following questions

- (a) In 1985, how many animals were captured in the wild?
- (b) In what year were 80 animals bred in the zoo?
- (c) In 1965, how many more animals were captured in the wild than were bred in the zoo?

3. Accurately construct a triangle with side lengths 2.5 cm, 4 cm, and 5 cm using a compass

3

4. A bag contains five balls, two white and three blue. A ball is withdrawn at random and not replaced. A second ball is then withdrawn at random

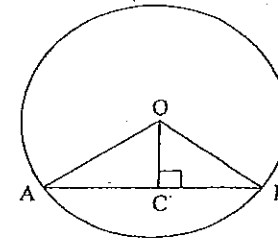
4

- (a) Draw a tree diagram listing all outcomes.
- (b) What is the probability that the first ball is blue?
- (c) What is the probability that both balls are blue?

5. Prove  $AC = CB$ .

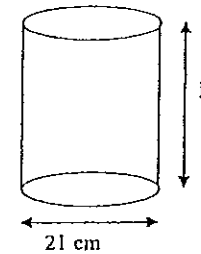
3

Note: O is the center of the circle and OC is drawn perpendicular to AB.



6.

4



A cylinder full of water has a diameter of 21 cm.

- (a) If the height of the cylinder is represented by the symbol h, write an expression for the volume of the cylinder.
- (b) The cylinder holds three litres of water. Determine the value of h.

**PART C (20 Marks) SHOW ALL WORKING**

1. Solve the following equations

(a)  $2(8a - 12) - 10a + 6 = 0$  2

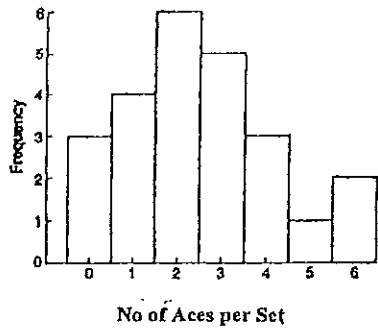
(b)  $6(b + 2) = 3b + 3$  2

2. A certain type of cordial contains by mass: 14 parts of lemon juice, 10 parts of sugar and 26 parts of water.  
How many kilograms of sugar is used in making 2.5 kg of cordial? 2

3. A car is travelling along a highway at 110 km/h. 3

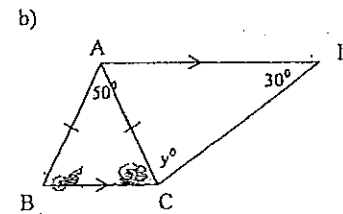
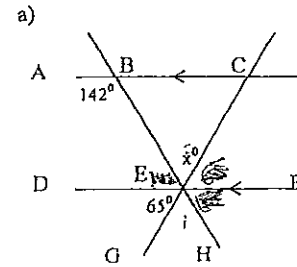
- (a) Express this speed in m/s  
(b) What time in minutes is required to travel a distance of 22 km?

4. This histogram shows the number of aces per set served by one of the finalists in the Australian Open in 2003. 5



- (a) Complete a frequency distribution table for this set of scores.  
(b) What is the mode for this data?  
(c) Determine the median score.  
(d) What is the mean number of aces per set?

4. Determine the value of the pronumeral in each figure, explaining your reasoning at each step.



**PART E (20 Marks) SHOW ALL WORKING**

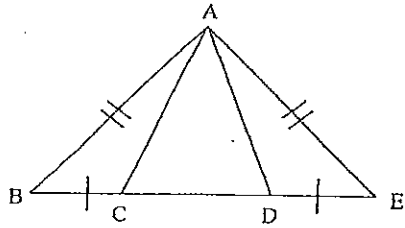
MARKS

1. Construct an angle of  $30^\circ$  using your compass.

2

2. Prove  $\triangle ABC \equiv \triangle ADE$ .

4



3. The tax payable on taxable income is set out in the following table.

5

Taxable Income		Tax on Taxable Income
From \$	To \$	
1	5 000	Nil
5 001	21 600	Nil plus 17 cents for every \$1 in excess of \$5000
21 601	52 000	\$2822 plus 30 cents for every \$1 in excess of \$21 600
52 000	62 500	\$11 942 plus 42 cents for every \$1 in excess of \$52 000

Rachel receives a salary of \$49 600.

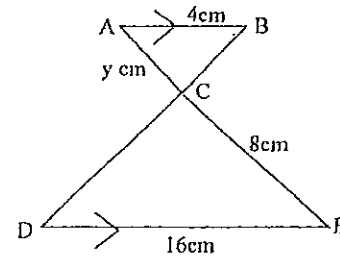
She receives an income from her investments of \$440.

Her total taxable deductions are \$1240.

- Find her taxable income
- Calculate the amount of tax payable.
- If her firm has deducted \$11,222 tax on a P.A.Y.E. basis, what refund should she receive from the Taxation Department?

4. (a) Prove  $\triangle ABC$  is similar to  $\triangle DEC$ .

3

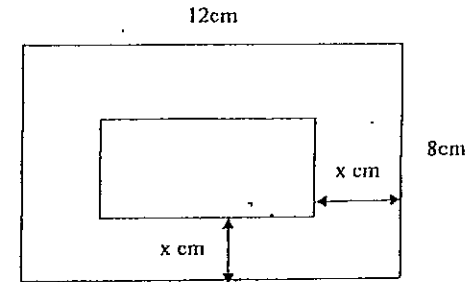


(b) Find the value of  $y$ .

2

5. A rectangle has sides of 12 cm and 8 cm.

4



A border of width  $x$  cm was cut off the rectangle as shown in the diagram.

The perimeter of the rectangle remaining was half the perimeter of the original rectangle.

Write an equation and solve it to find the value of  $x$ .

PART A

1 (a)  $10.82$  (2 d.p.) (1)

(b)  $2.995 \approx 3.00$  (2 d.p.) (1)

2. (a)  $\frac{21}{100}$  (1)

(b)  $3\frac{14}{25}$  (1)

3. (a)  $7x - 7$  (1)

(b)  $9a^6$  (1)

(c)  $\frac{9}{9}$  (1)

(d)  $20p^9$  (1)

4  $3b(b^2 - 2c)$  (1)

5  $18$  ( $\frac{3}{2} \times 12$ ) (1)

6  $100 + 4x^2 = 180$   
 $x = 20$  (1)

7.  $3x = 12$   
 $x = 4$  (1)

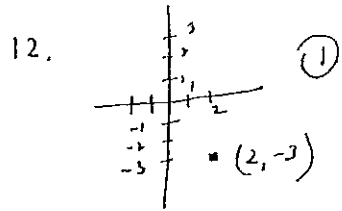
8 (a)  $2a + 6 + 8a = 10a + 6$  (1)

(b)  $\frac{1}{2} \times 4a \times 4a = 8a^2$  (1)

9.  $\frac{120}{4} = 30$  puses/h (1)

10. sector (1)

11.  $y = b - (2x - 2)$   
 $= 10$  (1)



13.  $\frac{8}{13}$  (1)

14.  $5$  (1)

PART B

1. (a)  $1.48 \times 100 = 148\%$  (1)

(b)  $\frac{6}{63} \times 100 = 9.522$  (1)

2. New salary =  $104.22 \times 26,800$   
 $= \$27925.60$  (2)

3. B.P. = \$360

S.P. = \$540

Profit = \$180 (1)

% of S.P. =  $\frac{180}{540} \times 100$   
 $= 33.33\%$  (1)

4. (a)  $3p(2x - 4) + 8p = 6px - 12p + 8p$   
 $= 6px - 4p$  (2)

(b)  $\left(\frac{2y}{3x}\right)^3 \div \frac{y}{9x} = \frac{8y^3}{27x^3} \times \frac{9x}{y}$   
 $= \frac{8y^2}{3x^2}$  (2)

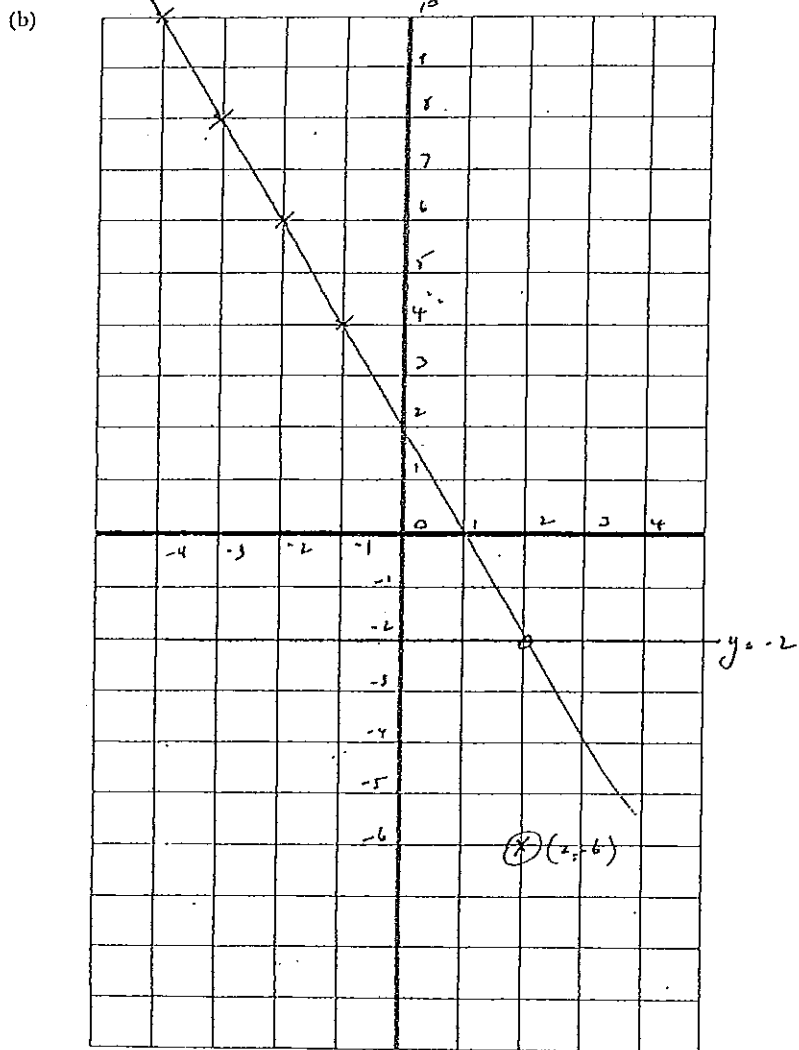
5. Pythagoras  $12^2 = 10^2 + x^2$  (1)

$x^2 = 144 - 100$

$x = 6.63$  (1)

PART B

6 (a)  $y = -2x + 2$



(c) No either from graph or substitution:  
 $y = -2x + 2$

PART C

1 (a)  $16a - 24 - 10a + 6 = 0$  ①

$6a - 18 = 0$

$6a = 18$

$a = 3$  ①

(b)  $6b + 12 = 3b + 3$  ①

$6b - 3b = 3 - 12$

$3b = -9$

$b = -3$  ①

2. Ratio by mass 14 : 10 : 26

Sugar =  $\frac{10}{14+10+26}$

$\therefore$  mass sugar =  $\frac{1}{5} \times 2.5 \text{ kg}$   
 = 0.5 kg

3. (a)  $\frac{110 \times 1000}{3600} = 30.56 \text{ m/s}$  ②

(b) time =  $\frac{22}{10} \times 60$   
 = 12 minutes ①

4.

②

x	f	fx
0	3	0
1	4	4
2	6	12
3	5	15
4	3	12
5	1	5
6	2	12
TOTAL	24	60

mode = 2 ①

median = 2 ①  
 (avg of 12th & 13 scores)

mean =  $\frac{60}{24}$  ①  
 = 2.5 acc/set

PART C

4 (a)  $\angle ABE = \angle DEH$  (corresp L's)  $\text{BC} \parallel \text{DE}$  ①  
 $= 142^\circ$

$\angle GEH = \angle BEC$  (vert opposite L's) ①

$x = 142^\circ - 65^\circ$  (sum adj L's) ①  
 $= 77^\circ$

(b)  $\angle ACB = \angle AOC$  (base angles in isosceles  $\Delta$ )

$\therefore \angle ABC = \frac{180 - 50}{2}$  ①  
 $= 65^\circ$

$\angle ADC + \angle DCB = 180^\circ$  (co-interior L's  $\parallel$  lines) ①  
 $AD \parallel BC$

$\therefore 30^\circ + 65^\circ + y^\circ = 180^\circ$   
 $y^\circ = 85^\circ$  ①

PART D

1.  $\angle AGF = \angle BGH$  (vert opp angle) ①

$\angle BGH = \angle DHE$  (corresp L's  $\parallel$  lines)

$\therefore \angle AGF = \angle EHD$  ③

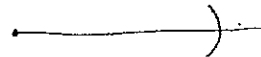
2. (a) 38 ①

(b)  $-1990$  ①

(c)  $100 - 10 = 90$  ①

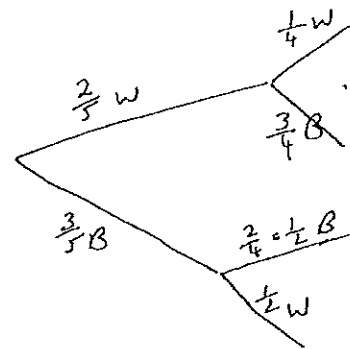
③

③



4.

(a)



②

(b)  $\frac{3}{5}$

(c)  $\frac{3}{5} + \frac{1}{2} = \frac{3}{10}$

5.  $OA = OB$  (radii of circle)  
 $OC$  is common  
 $\angle OCB = \angle OCA = r \angle L$

$\therefore AC = CB$  (corresponding sides)

$\therefore \angle AOC = \angle BOC$  (RHS)



## PART D.

$$6. (a) V = \pi r^2 h$$

$$= \pi \left(\frac{21}{2}\right)^2 h$$

$$V = \frac{\pi \cdot 110.25 \cdot h}{1}$$

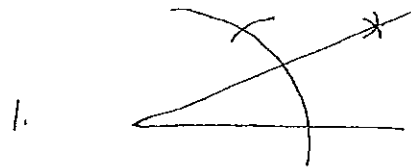
$$\textcircled{or} V = \underline{346.36 h}$$

$$(b) V = 3000 \text{ cm}^3$$

$$h = \frac{3000}{346.36}$$

$$= 8.66 \text{ cm}$$

## PART E



2.  $\triangle ABC = \triangle AED$  (angles  $\angle$  isosceles  $\circ$ )  
 $AB = AE$  (given)  
 $BC = ED$  (given)  
 $\therefore \triangle ABC \cong \triangle AED$  (SAS)

3. (a) taxable income =  $\$49,600 + \$440 - \$1240$   
 $= \$48,800$  (2)

(b) tax payable =  $\$2822 + 0.30(48,800 - 21,600)$   
 $= \$10,982$  (2)

(c) refund =  $\$11,222 - \$10,982$   
 $= \$240$  (1)

4.  $\triangle BCA = \triangle DEC$  (vert opp)  
 $\triangle BAC = \triangle CED$  (alt  $\angle$ 's  $\parallel$  lines)  
 $\triangle ABC = \triangle EDC$  (alt  $\angle$ 's  $\parallel$  lines)

$\therefore \triangle ABC \parallel \triangle EDC$  (AAA) (3)

(b)  $\frac{4}{16} = \frac{y}{8}$  (1)  
 $y = 2$

5.

$$P \text{ of large rectangle} = 2(12+8) \\ = 40 \quad \textcircled{1}$$

$$P \text{ of small rectangle} = 2(12-2x) + 2(8-2x) \quad \textcircled{1}$$

$$\therefore 24 - 4x + 16 - 4x = \frac{40}{2} \quad \textcircled{1}$$

$$40 - 8x = 20$$

$$8x = \frac{20}{8}$$

$$x = 2.5 \quad \textcircled{1}$$

?