



SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2005
YEAR 10 YEARLY EXAMINATION

Advanced Mathematics

Directions to Candidates:

- Answer all questions in the spaces provided in this question booklet.
- Full marks may not be awarded for careless or badly arranged work.
- Use black or blue pen for written answers, but pencil for diagrams and graphs.

- If additional working space is needed, use the spare pages at the end of the booklet. Show clearly which question you are continuing.
- Board-approved calculators may be used.

Time allowed: 120 minutes

Examiner: D.M.Hespe

Name: _____

Your Mathematics Class (Tick the box)	
10MaA Mr Choy	<input type="checkbox"/>
10MaB Ms Kourtesis	<input type="checkbox"/>
10MaC Ms Ward	<input type="checkbox"/>
10MaD Mr Gainford	<input type="checkbox"/>
10MaE Mr Parker	<input type="checkbox"/>
10MaF Mr Boros	<input type="checkbox"/>

Markers' Use Only	
Question 1	/20
Question 2	/20
Question 3	/15
Question 4	/15
Question 5	/15
Question 6	/15
Total	/100

Question 1 (20 marks)

Answers

(a) Express $\frac{2}{15}$ as a recurring decimal. 1

(b) Write $\frac{3}{8} + \frac{5}{6}$ as a single fraction. 1

(c) What is the value of $0.04 \times (0.3)^2$? 1

(d) Find 19% of \$38 000 000. 1

(e) Simplify $-6p + 2q + p - 5q$. 1

(f) Factorise $5 - 10y$. 1

(g) Write as an algebraic expression:
 "Half of the sum of x and y ." 1

(h) Find correct to two decimal places $\frac{5.28}{57.3 \times 13}$. 1

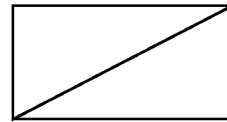
(i) Write down the value of $\sin 34^\circ 15'$ (correct to 3 significant figures). 1

(j) Convert S15°E to a True bearing. 1

(k) Evaluate $\sqrt{17^2 - 15^2}$. 1

(l) Write $2^3 \times 2^6$ in simplest index notation. 1

(m) A farm gate is 2 m high and 3 m wide.
Find the exact length of the diagonal strut. 1

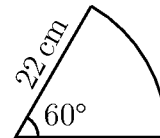


NOT TO SCALE

(n) Simplify $(x^2y)^3 \div (x^3y)^2$. 1

(o) Express $\frac{4}{\sqrt{8}}$ with a rational denominator. 1

(p) Find the area of the sector in terms of π . 1



(q) Solve $2 - x = -5$. 1

(r) If $v^2 = u^2 + 2aS$, find v when $u = 2$,
 $a = 10$, and $S = 3$. 1

(s)  Find x . 1

(t) My *Edvest* account pays 6% p.a. simple interest.
If I invest \$1200 for two years, what will my
investment be worth? 1

Question 2 (20 marks)**Answers**

(a) Fully factorise the following:

(i) $t^2 - 10t + 16$

1

(ii) $4x^2 - 4$

2

(b) Find the smallest part when \$19 is divided in the ratio 2 : 3 : 5.

2

(c) With the aid of a diagram, explain what is wrong with the following proof:

4

In $\triangle s ABC, PQR,$
 $\angle ABC = \angle QRP = 65^\circ,$
 $\angle BCA = \angle QPR = 35^\circ,$
 $BC = QP = 15 \text{ cm.}$
 $\therefore \triangle ABC \equiv \triangle PQR \text{ (AAS).}$

(d) Given the points $A(3, 6)$ and $B(-3, -2)$, write down the

(i) midpoint of AB ,

1

(ii) length of the interval AB ,

1

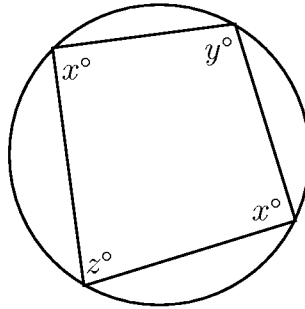
(iii) gradient of the line AB .

1

(e) Find x if $5\sqrt{7} - \sqrt{x} = 0$.

2

(f)



(i) Find the value of x , giving reasons.

2

(ii) Write an equation connecting z and y .

1

(g) Solve simultaneously, the system of equations

3

$$\begin{aligned}4x - 5y &= 2 \\3x - 2y &= -2\end{aligned}$$

Question 3 (15 marks)**Answers**

- (a) Evaluate the pronumerals to the nearest whole number or whole degree, as appropriate.

(i) $b = \frac{33 \cdot 8 \sin 117^\circ}{\sin 38^\circ}$

1

(ii) $c^2 = 36^2 + 23^2 - 2 \times 36 \times 23 \cos 28^\circ$

1

(iii) $\sin A = \frac{407 \sin 71^\circ}{586}$

1

-
- (b) Find the volume and total surface area of a solid cone of radius 5 cm and slant height 13 cm.

4

(c) Find all possible values of ϑ , given $0^\circ \leq \vartheta \leq 360^\circ$.

(i) $\cos \vartheta = \frac{1}{\sqrt{2}}$.

1

(ii) $\tan \vartheta = -\sqrt{3}$.

1

(d) Three coins are tossed simultaneously.

(i) Use a tree diagram to write out the sample space.

3

Find the probability of obtaining

(ii) three heads,

1

(iii) at least one head,

1

(iv) at most one head.

1

Question 4 (15 marks)

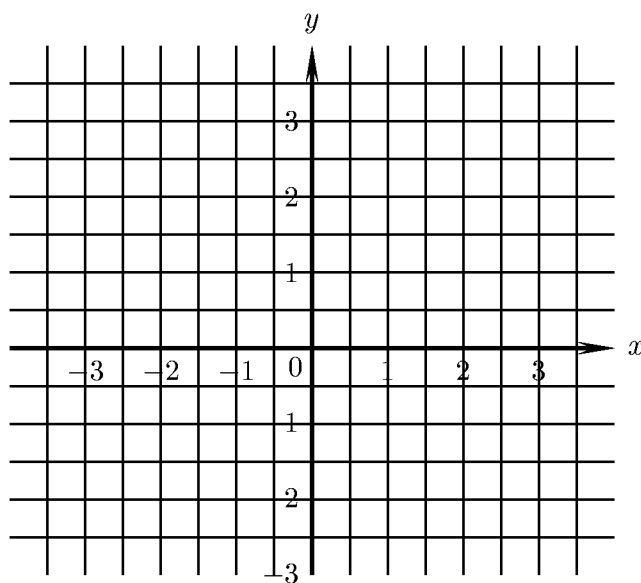
Answers

- (a) Find (to the nearest dollar) the compound interest earned if \$96 000 is invested for 5 years at 6.5% p.a.

2

- (b) Sketch $y = x^2 - 2x$ on the grid below, showing clearly any intercepts and maximum or minimum points.

3



- (c) Solve $x^2 = 3x + 7$ by the method of completing the square. Give your answer as a surd in simplest form and as a decimal approximation correct to 2 decimal places.

3

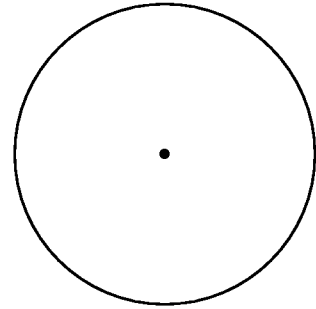
- (d) The probability that a certain event will happen is $\frac{1}{x}$. Which of the following is the probability that the event will not happen?

1

$$\frac{x}{1}, \quad \frac{1-x}{x}, \quad \frac{x+1}{x}, \quad \frac{x-1}{x}, \quad \frac{x}{x-1}$$

- (e) Prove that equal chords subtend equal angles at the centre of a circle.

3



- (f) When blowing up a balloon, the first hearty breath gives a diameter of 7 cm. By the time it is fully blown up, its diameter is 21 cm.

Find in simplest form:

- (i) the ratio of these diameters,

1

- (ii) the ratio of the respective surface areas,

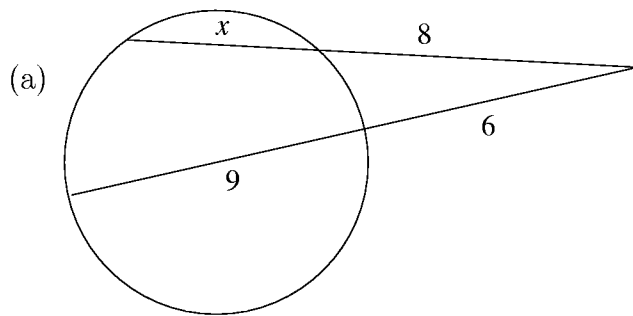
1

- (iii) the ratio of the respective volumes.

1

Question 5 (15 marks)

Answers



2

Find x .

- (b) If $\frac{3}{4}$ of the boys in a junior class use a backpack, and $\frac{2}{5}$ are not in full uniform, find the probability that a boy chosen by lot would be in uniform and using a backpack.

3

- (c) The numbers 30, 67, x , 2, 24, 9, 7, 83 have a mean of 32.

(i) Calculate the value of x .

2

(ii) Find the median.

1

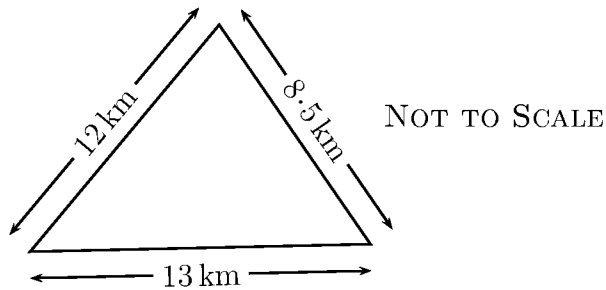
(iii) Use your calculator to find the standard deviation correct to three significant figures.

1

- (d) A is a wireless station 35 nautical miles East of another station at B . A ship in a fog discovers by wireless direction finder that she is $S20^\circ E$ of B and $S55^\circ W$ of A . How far is she from B (to the nearest nautical mile).

3

(e)



- (i) Calculate the size of the smallest angle in this triangle correct to the nearest minute.

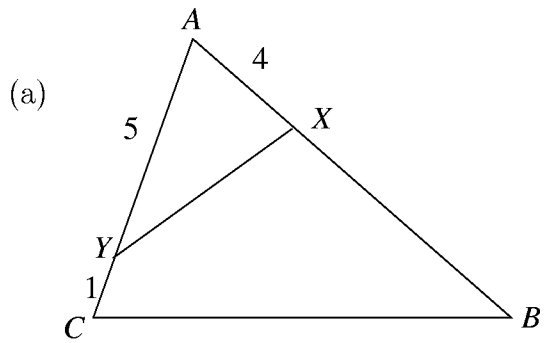
2

- (ii) Hence find its area to the nearest square metre.

1

Question 6 (15 marks)

Answers



$$\begin{aligned}
 AX &= 4, \\
 AY &= 5, \\
 YC &= 1, \\
 \angle AXY &= \angle ACB.
 \end{aligned}$$

Calculate, giving reasons, the value of the following ratios:

(i) $XY : CB$

3

(ii) Area $\triangle AXY : \text{area } \triangle ACB$

2

(iii) Area $\triangle AXY : \text{area } \triangle AXC$

2

(b) If $\frac{1}{x} = \frac{1}{a} + \frac{1}{b}$,

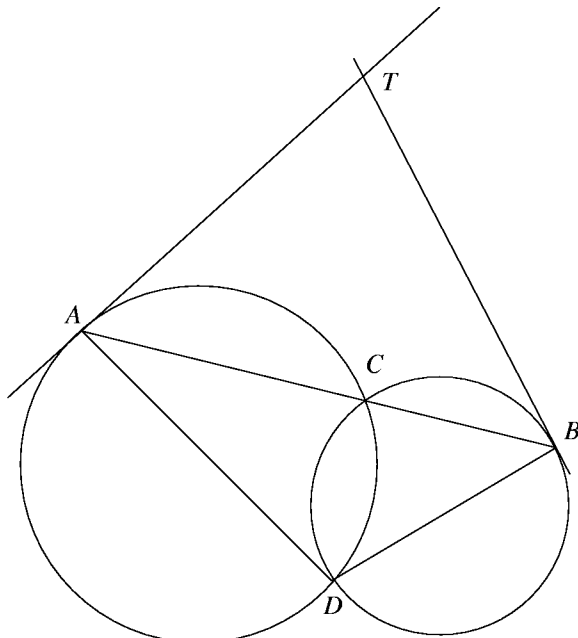
(i) show that $x = \frac{ab}{a+b}$.

1

(ii) Hence prove that $\sqrt{\frac{a-x}{b-x}} = \frac{a}{b}$ where a, b are positive.

2

(c)



5

ACB is a straight line.

TA and TB are tangents to the circles.

Prove that $TADB$ is a cyclic quadrilateral.

End of Paper

Extra working page

Extra working page