



SYDNEY BOYS HIGH
MOORE PARK, SURRY HILLS

2004
YEAR 9 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: 90 minutes
Examiner: D.M.Hespe

Name: _____

| Your Mathematics Class (Tick the box) | | |
|--|--------------|--------------------------|
| 9MaA | Mr Choy | <input type="checkbox"/> |
| 9MaB | Mr Kourtesis | <input type="checkbox"/> |
| 9MaC | Ms Ward | <input type="checkbox"/> |
| 9MaD | Mr Gainford | <input type="checkbox"/> |
| 9MaE | Mr Parker | <input type="checkbox"/> |
| 9MaF | 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) Find 140% of 20l. _____ 1
- (b) Put the ratio $1\frac{1}{2} : 2\frac{3}{4}$ in simplest form. _____ 1
- (c) Write $\sqrt{33}$ correct to two decimal places. _____ 1
- (d) Expand $-2(x - 2)$. _____ 1
- (e) Evaluate $\sin 30^\circ$ _____ 1
- (f) Factorise $xy - 2y^2$. _____ 1
- (g) Write as a single fraction $\frac{2x}{3} - \frac{x}{12}$. _____ 1
- (h) Simplify $\frac{2q}{5} \div \frac{q}{10}$. _____ 1
- (i) Find the value of t if
(i) $7^t = 2401$, _____ 1
- (ii) $7^t = \frac{1}{343}$. _____ 1

- (j) Write in scientific notation:
- (i) 2004, _____ 1
- (ii) 0.001990. _____ 1
- (k) Which of the following numbers is/are irrational?
 $\{\frac{355}{113}, \sqrt{4 \cdot 41}, \sqrt{8}, 1.\dot{0}39, 7^{-2}\}$ _____ 1
- (l) Find p if $3\sqrt{p} = \sqrt{171}$. _____ 1
- (m) Simplify $\sqrt{12} + \sqrt{75}$. _____ 1
- (n) Express 720 ms^{-1} in kilometres per hour. _____ 1
- (o) Solve for the pronumeral:
- (i) $r + 7 = 5$, _____ 1
- (ii) $5q = 17$. _____ 1
- (p) What is the angle sum of a pentagon? _____ 1
- (q) Simplify $\frac{4x - 22}{2}$. _____ 1

Question 2 (20 marks)

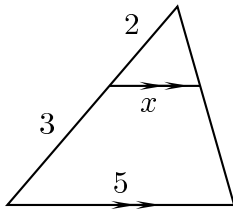
Answers

(a) Use your calculator to find $\cos 40^\circ + \cos 50^\circ$ _____
 correct to 3 decimal places.

1

(b) Find x . _____

1



(c) A shopkeeper marks up what he buys by 30% and the selling price of an article is \$78.

2

What is
 (i) its cost price? _____

(ii) the profit? _____

(d) Expand then simplify.

(i) $(g - 5)^2$ _____

1

(ii) $(g - 4)(g + 4)$ _____

1

(iii) $(g + 3)(2 - 3g)$ _____

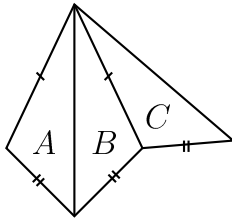
2

- (e) Karol's average reaction time when driving was measured to be 0.8 seconds. How far would his motorbike travel in this time if its speed was 60 km/h? (Answer to the nearest metre)

2

- (f) Choose a pair of congruent triangles. State why they are congruent.

2



- (g) Find the equation of a line with a gradient of -5 and a y -intercept of 3.

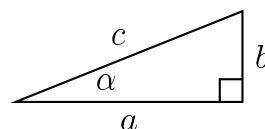
2

- (h) Find the simultaneous solution of $y = x + 3$ and $x + y = 7$ by the method of substitution.

3

- (i) Write down expressions for $\sin \alpha$, $\cos \alpha$, and $\tan \alpha$.

3



Question 3 (15 marks)

Answers

- (a) Write with a rational denominator in simplest form:

2

$$\frac{9}{2\sqrt{5} + 2}$$

- (b) Given the points $A(3, -7)$ and $B(-9, -2)$, write down the
- length of AB ,
 - mid-point of AB ,
 - slope of AB .

3

- (c) A supermarket has two sizes of toothpaste on special: 120 g at \$2.59 and 140 g at \$2.99. Show why one is a better buy.

2

- (d) Factorise the following expressions.

(i) $n^2 + 4n - 12$

1

(ii) $10k^2 - 9k + 2$

2

(iii) $8a - b + 4ab - 2$

2

- (e) Solve the following pair of equations simultaneously using the method of elimination.

3

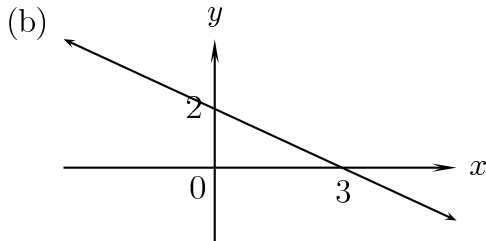
$$\begin{aligned} 3x + 2y &= -2 \\ 5x - y &= 27 \end{aligned}$$

Question 4 (15 marks)

Answers

(a) Express $y = \frac{1}{3}x - \frac{3}{5}$ in general form.

1

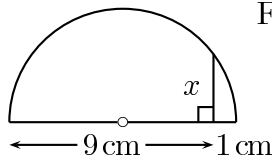


2

Find the equation of the straight line.

(c) Find x .

2



(d) At what point does the line $y = 7x + 15$ meet the line $3x - 5y = 21$?

3

(e) Find the measure of all the angles of the triangle which has sides 3 cm, 4 cm, and 5 cm.

3

(f) Why are the following not possible tests for congruence?

(i) Corresponding angles are equal.

2

(ii) Two sides of one triangle equal two sides of another triangle and an angle of one equals an angle of the other.

2

Question 5 (15 marks)

Answers

- (a) Write down the slope of the line $3x - 2y = 17$. 1
- (b) Jack is offered two options by a finance company— 4
- Invest \$10 000 at 3.5% p.a. compound interest for 3 years
 - Invest \$10 000 at 4% p.a. simple interest for 3 years.
- Which of these should he choose and why?
- (c) A circle has its radius reduced by 20%. How much will the area be reduced? 2
- (d) Prove that the area of a rhombus can be calculated from its diagonal lengths according to the formula: 4
- $$\text{Area} = \frac{1}{2}ab.$$
- [Note: draw a clear diagram.]
- (e) Gravity g varies inversely with distance D from the centre of the earth, *i.e.*, $g \propto \frac{1}{D}$. On the surface of earth (radius 6 400 km) gravity measures 9.8 m/s^2 . Calculate gravity 200 km above the surface (correct to the nearest 0.1 m/s^2). 4

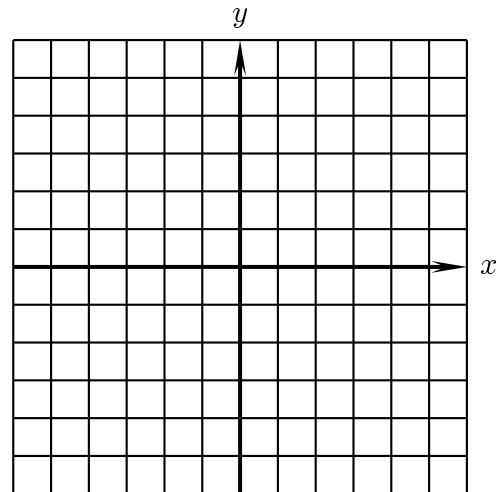
Question 6 (15 marks)

Answers

(a) If $\cos 12^\circ = \sin 18^\circ + \sin \theta^\circ$, find θ .

2

(b) Sketch $2y < 5 - 3x$.



2

(c) Which is a better fit: a round peg in a square hole or a square peg in a round hole? Show your reasoning clearly.

3

- (d) A number made up of two digits is four times the sum of its digits. Show that there are four numbers with this property.

[**Hint:** the number $43 = 4 \times 10 + 3$.]

4

- (e) My bicycle trip to school's front door is exactly 14 kilometres. My average speed was 21.1 km/h, but after walking the bike to the storage room at a steady speed of 4.5 km/h, the average speed had dropped to 20.6 km/h. How far did I travel from the front door to the storage room? (Answer to the nearest metre.)

4

End of Paper

Extra working page

Extra working page