



SCEGGS Darlinghurst

2011

Preliminary Course

Assessment Task 1
Thursday 10th March 2011

Mathematics

Task Weighting: 10%
Outcomes Assessed: P3 and P4

General Instructions

- Time allowed – 1 hour
- Write your Student Number at the top of each page
- Start each question on a new page
- Attempt all questions and show all necessary working
- Answer all questions on the pad paper provided
- Marks will be deducted for careless or badly arranged work
- Mathematical templates, geometrical equipment and scientific calculators may be used



Centre Number

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Student Number

Total marks – 40

- Attempt Questions 1 – 3

Question	Reasoning	Communication	Marks
1			/13
2			/15
3			/14
TOTAL			/42

Question 1 (13 marks)

Marks

- a) Evaluate and give your answer in scientific notation to 3 significant figures. 2

$$\sqrt{\frac{2.6 \times 0.03}{8795}}$$

- b) Simplify fully

i. $\sqrt{28} + \sqrt{63}$ 2

ii. $\sqrt{\frac{x^4}{9}}$ 1

- c) Write 0.123 as a fraction in simplest form. 2

- d) After buying cars second hand, Ronnie the used car salesman sells them at a higher price to make a profit. If a mark-up of 40% results in a selling price of \$25 200, how much did Ronnie pay for the car originally? 2

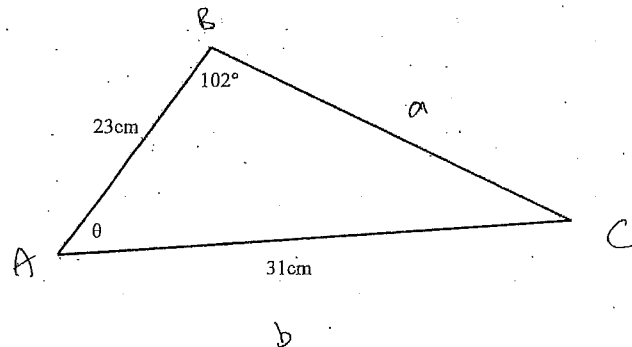
e) Rationalise and simplify to find the value of a and b if:

2

$$\frac{\sqrt{12} - 5}{\sqrt{3} - 2} = a + \sqrt{b}$$

f) Find θ to the nearest degree in the triangle below.

2



a) Simplify fully

$$3x - (x - 4)^2$$

2

b) Factorise fully

$$8x^3 + 1$$

2

c) Solve the following equations

i. $\frac{x+3}{5} - 4x = \frac{x}{3}$

2

ii. $\left| \frac{x}{2} + 3 \right| = 4$

2

iii. $4^x = \frac{1}{8}$

2

iv. $x(2x - 3) = 5$

2

d) Solve the inequality:

$$x^2 - 4x > 0$$

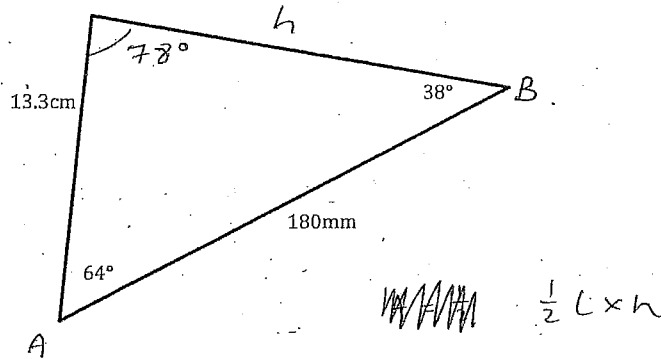
3

~~$$\cos A = \frac{b^2 + c^2 - a^2}{2ab \cos A}$$~~

$$a^2 = b^2 + c^2 - 2ab \cos A$$

$$\cos A = \frac{b^2 + c^2 - a^2}{2ab}$$

- a) Calculate the area of the triangle shown, correct to 2 decimal places. 2



- b) Solve the following simultaneous equations 2

$$3x + 2y = 11$$

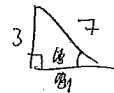
$$4x - 4y = 18$$

- c) Find the exact value of 2

$$\frac{\sin 30^\circ}{\sec 45^\circ}$$

SOH CAH TOA

- d) Given that θ is acute and $\sin \theta = \frac{3}{7}$, find the exact value of $\tan \theta$. 2



- e) Maude and Miguel are at a camp ground(C) in the National park. Maude decides to go for a swim in the lake(L) and travels on a bearing of 218° for 315m. Miguel would prefer to climb Mount Meetme(M) and travels on a bearing of 145° for 802m.

- i. Draw a clear diagram showing this information. 1
(Your diagram must be at least 1/3 of a page in size.)
- ii. Find, correct to the nearest metre, the distance from the lake to Mount Meetme. 2
- iii. Find the bearing of the Lake from Mount Meetme, correct to the nearest degree. 3

End of Examination

2011 Task 1 - Preliminary Mathematics

① a) 2.98×10^{-3} ✓ round
✓ sci.

b) i. $2\sqrt{7} + 3\sqrt{7}$ ✓
 $= 5\sqrt{7}$ ✓

ii. $\frac{x^2}{3}$ ✓

c) $10x = 1.2\bar{3}$
 $1000x = 123.\bar{2}3$
 $1000x - 10x = 122$
 $990x = 122$
 $x = \frac{61}{495}$ ✓✓

d) $140\% = 25\ 200$ ✓
 $100\% = 18\ 000$
∴ Ronnie paid \$18000 ✓

e) $\frac{2\sqrt{3}-5}{\sqrt{3}-2} \times \frac{\sqrt{3}+2}{\sqrt{3}+2}$
 $= \frac{6-5\sqrt{3}+4\sqrt{3}-10}{3-4}$ ✓
 $= \frac{-4-\sqrt{3}}{-1}$
 $= 4+\sqrt{3}$
∴ $a=4, b=3$ ✓

f) 3rd angle: $\frac{\sin \alpha}{23} = \frac{\sin 102}{21}$
 $\alpha = 47^\circ$ ✓
∴ $\alpha = 31^\circ$ ✓

Reas 2.

Total /13 Reas

Surprisingly poorly done

Make sure the 23 lines up before you subtract!

Well done.

Lots of mistakes in people's working in this question. Quite poorly done.

This triangle is not right-angle so you cannot apply SOHCAHTOA.

Question 2

a) $3x - (x-4)^2$
 $= 3x - (x^2 - 8x + 16)$
 $= 3x - x^2 + 8x - 16$
 $= -x^2 + 11x - 16$

b) $8x^3 + 1$
 $= (2x+1)(4x^2 - 2x + 1)$

c) (i) $\frac{x+3}{-5} - 4x = \frac{x}{3}$

$3(x+3) - 60x = 5x$
 $3x+9 - 60x = 5x$
 $9 = 62x$
 $x = \frac{9}{62}$

(ii) $|\frac{x}{2} + 3| = 4$

either $\frac{x}{2} + 3 = 4$

$\frac{x}{2} = 1, x = 2$

or $-(\frac{x}{2} + 3) = 4$

$-\frac{x}{2} - 3 = 4$

$-\frac{x}{2} = 7$

$x = -14$

(iii) $4^x = 8^{-1}$
 $(2^2)^x = (2^3)^{-1}$
 $2^{2x} = 2^{-3}$

$2x = -3 \rightarrow x = -\frac{3}{2}$

Be careful to include bracket!

Reasonably well done, but remember signs!

Multiply thru by L.C.D (20)

Absolute value means there are two cases positive + negative

Quite well done

c) (ii)

$$x(2x-3) = 5$$

$$2x^2 - 3x - 5 = 0$$

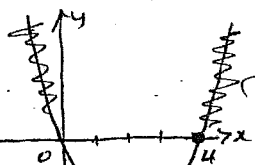
$$(2x-5)(x+1) = 0$$

$$x = -1, x = \frac{5}{2}$$

d) $x^2 - 4x > 0$

$$x(x-4) > 0$$

L.H.S is parabolic !!



Above x axis!

$$\therefore x < 0 \text{ or } x > 4$$

Mostly well done

You need to find critical points $x=0$ and $x=4$

You also must TEST your regions or Draw a picture

Question 3

a) $A = \frac{1}{2} ab \sin C$ (You need to use two sides and the included angle.)

$$= \frac{1}{2} \times 13.3 \times 18 \times \sin 64^\circ$$

$$= 107.99 \text{ cm}^2 \text{ (2dp)}$$

or 10758.56 mm^2

Note: Converting square units

1 cm = 10 mm
1 cm ² = 100 mm ²

Everyone should have known how to do this very easy question. Note that there are different units that you have to make the same before multiplying

b) $3x + 2y = 11$ (1) (Elimination method is the easiest option.)

$$4x - 4y = 18$$
 (2)

(1) x 2 $6x + 4y = 22$ (3)

Add (2) + (3)

$$10x = 40$$

$$x = 4$$

Subst. into (1)

$$12 + 2y = 11$$

$$2y = -1$$

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

Solution $x = 4$
 $y = -\frac{1}{2}$

This part was well done, Easy! Remember. Same Signs \Rightarrow Subtract Different Signs \Rightarrow add.

c)

Learn these triangles off by heart correctly.

$$\frac{\sin 30^\circ}{\sec 45^\circ}$$

$$= \sin 30^\circ \div \frac{1}{\cos 45^\circ}$$

$$= \frac{1}{2} \div \frac{1}{\frac{1}{\sqrt{2}}}$$

$$= \frac{1}{2} \times \sqrt{2}$$

$$= \frac{\sqrt{2}}{2}$$

(If rationalised the answer is $\frac{1}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{4}$)

Many students had issues with division of fractions. Make sure you know your exact ratios correctly.

d) Draw a triangle

Use Pythagoras' rule then find $\tan \theta$.

$$x^2 = 7^2 - 3^2$$

$$= 40$$

$$x = \sqrt{40}$$

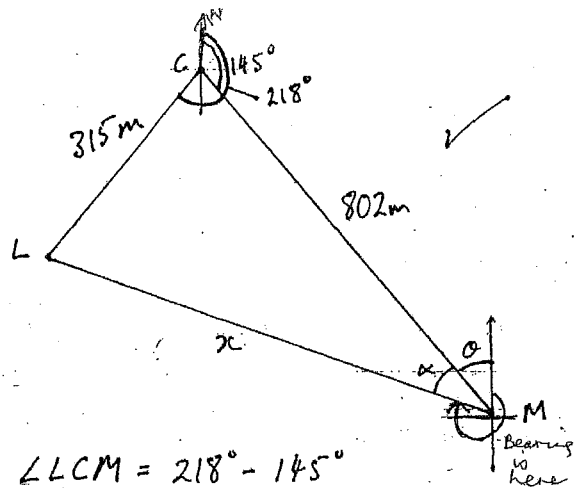
(Leave exact)

$$\therefore \tan \theta = \frac{3}{\sqrt{40}} \text{ or } \frac{3}{\sqrt{40}} \text{ or } \frac{3\sqrt{10}}{20}$$

Note that. $\sqrt{40} \approx 6.3$ but the decimal is an approximation not an exact answer.

Question ③ continued.

e) i.



ii. $\angle LCM = 218^\circ - 145^\circ = 73^\circ$

$$x^2 = 315^2 + 802^2 - 2 \times 315 \times 802 \times \cos 73^\circ$$

$$x^2 = 594705$$

$$x = 771\text{m}$$

Your drawing should be at least $\frac{1}{3}$ page as instructed. (Comm 1)

Note that ML is not an East-West line. Some students were confused with this aspect of the drawing so couldn't get the bearing in e) iii)

iii $\theta = 180 - 145 = 35^\circ$

$$\frac{\sin \alpha}{315} = \frac{\sin 73}{771}$$

(Cosine Rule works here as well)

$$\sin \alpha = \frac{315 \times \sin 73}{771}$$

$$\alpha = 23^\circ$$

$$\therefore \text{Bearing} = 360 - 23 - 35 = 302^\circ$$

(Reas 3)

Well done by those who had good, clear diagrams.

Mark the bearing clearly on your diagram so that you can see the steps you need to follow.

General Comments.

- Set out working down the page. New line for each new equal sign.
- Use more paper (one side only) and spread working out.

LEARN THE FORMULAS
sine rule
cosine rule
area of triangles