

Year 10 Mathematics

2012 Examination

Time: 2 hours

Sections	Result
1 Number	
2 Algebra	
3 Graphs	
4 Measurement	
5 Trigonometry	

Section 1 Number

QUESTION ONE

Samara makes a batch of 16 muffins.

- (a) If she only ices $\frac{3}{4}$ of them, how many will be left un-iced?

- (b) If Samara's 16 muffins make up $\frac{1}{12}$ of the muffins in a school cake stall, how many muffins are in the cake stall?

QUESTION TWO

The price list at a school canteen reads:

Filled roll	\$3.20
Pie	\$2.80
Muesli bar	\$1.50
Piece of fruit	\$0.80
Nachos	\$5.40
Pizza bread	\$3.10
Fruit Smoothie	\$4.30

- (a) Hemi is buying lunch for himself and three friends. He buys 2 filled rolls, one portion of nachos, 3 pieces of fruit and 4 muesli bars.

- (i) What will his purchases cost?

- (ii) If he gets an 8% discount for a large order, how much will his discount be?

- (iii) Hemi's friend Jim said that he once spent 25% more than Hemi's original bill on just one lunch! How much did Jim's lunch cost?

- (b) The canteen prices all include 15% GST. Choose any **two** items from the canteen list on the previous page and work out the GST exclusive price for these items. Make sure you state which items you chose.

QUESTION THREE



An underweight pet cat weighs 2.8 kg. The vet says that it should weigh at least 3.5 kg.

- (a) If the cat puts on all the weight required, what will the percentage increase in its weight be?

- (b) If the cat's weight increases 40% instead, what will its new weight be?

- (c) The cat eventually put on 0.6 kg. Give this as a **fraction** of its original body weight

QUESTION FOUR

- (a) Write the following numbers in **standard form**:

(i) $4560000 =$ _____

(ii) $0.0002517 =$ _____

- (b) Write the answer to this question in standard form:

$$4.9 \times 10^{52} \times 6.9 \times 10^{81}$$

QUESTION FIVE

Sunnie has two bank accounts. His cheque account is overdrawn and has a balance of \$ 168. His savings account contains \$1538.

- (a) How much money does Sunnie have altogether?

- (b) Explain why it would be undesirable for Sunnie to double his cheque account balance.

- (c) If Sunnie wishes to buy a stereo system worth \$1200 but still have \$500 left in the bank for emergencies, how long will this take him if he is saving \$20 per week?

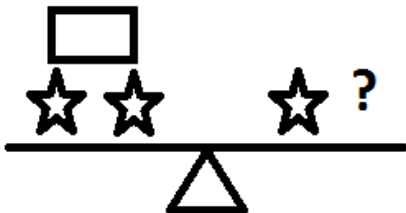
Section 2 Algebra

QUESTION ONE

If the following “scales” are balanced



What needs to be added to the right hand side of this scale in order to balance it?



QUESTION TWO

In each of these equations, n stands for a number. Write what number it stands for. Where indicated, show your working.

(a) $4 + n = 15$ $n =$ _____

(b) $5n = 20$ $n =$ _____

(c) $24 - n = 14$ $n =$ _____

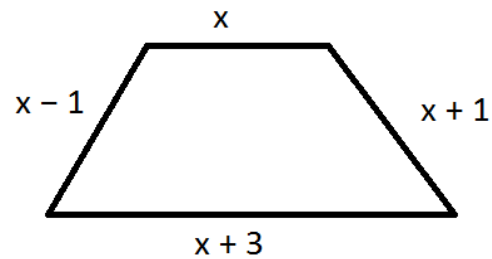
(d) $4n + 3 = 27$

 $n =$ _____

(e) $6n - 5 = 3$

 $n =$ _____

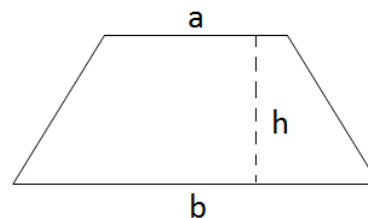
QUESTION THREE



- (a) Write and **simplify** an expression for the perimeter of this trapezium.

- (b) One such trapezium has a perimeter of 17. Calculate the value of x .

QUESTION FOUR



The area of a trapezium is given by the formula $A = \frac{1}{2}(a+b) \times h$

- (a) Find the area of a trapezium where $a = 3$, $b = 7$ and $h = 4$.

- (b) If a trapezium has an area of 42 cm^2 , $h = 8$ and $b = 6$, the formula can be rewritten as $42 = 4(a + 6)$. Find the length of side a .

QUESTION FIVE

Samara wants to throw a large party for her birthday. She needs to budget \$15 per person for snack food and drinks and have \$120 left over for decorations and other incidentals. She has \$900 put aside for the party.

- (a) Write an equation that could be used to work out the number of people Samara can afford to invite.

- (b) Solve your equation. Show all working.

QUESTION SIX

Expand (and simplify where possible)

(a) $4(n + 2)$ _____

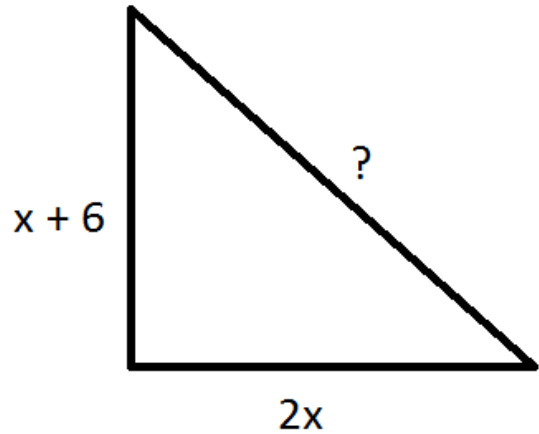
(b) $5(x + y)$ _____

(c) $2x(4 - 3x)$ _____

(d) $(5 + p)(p - 2)$ _____

(a) $\frac{x}{6} + \frac{2x}{7}$ _____

QUESTION SEVEN



- (a) Write and simplify an expression for the **area** of this triangle. (Recall that the area of a triangle = $\frac{1}{2}$ base \times height).

- (b) If the area of this triangle is 16 cm^2 , what is the value of x ? Show your working.

- (c) Recall Pythagoras' theorem

$$a^2 + b^2 = c^2$$

where a and b are the two shorter sides and c is the hypotenuse (longest side).

Write an expression for the length of the third side of this triangle in terms of x .

Section 3 Graphs

QUESTION ONE

Give the next two items in each of the following patterns/sequences:

(a) 3, 7, 11, 15, _____, _____

(b) 6, -1, -8, _____, _____

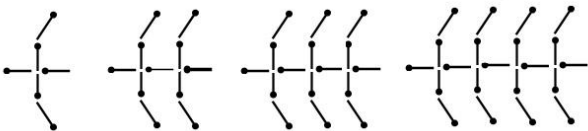
(c) 3, 6, 11, 18, _____, _____

(d)



QUESTION TWO

Stu has been studying lizards. He makes a matchstick pattern based on a lizard's backbone.



(a) The first four designs in the pattern are shown. Draw the fifth design.

(b) Complete the table for the backbone pattern

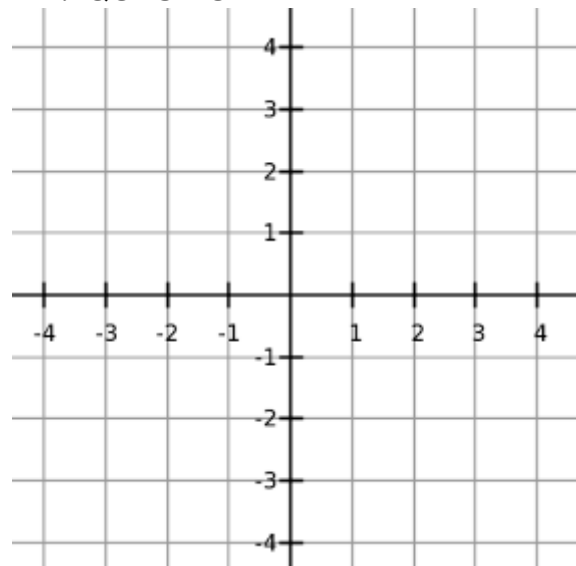
Design number	Number of matches
1	6
2	
3	
4	
5	

(c) Work out a rule that connects the number of matches to the pattern number

(d) Use the rule to work out how many matches would be needed to make the 15th pattern.

(e) If Stu has 123 matches, what is the largest design number that he could make?

QUESTION THREE



Plot the following points on the graph in order and join (like a "dot to dot")

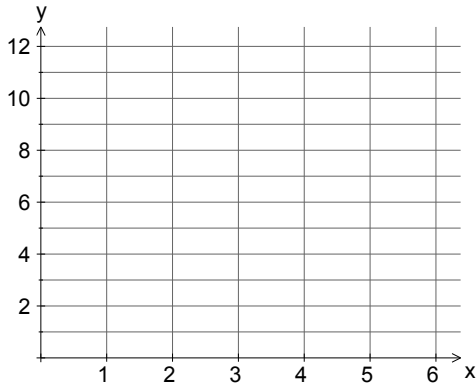
(0, -2), (2, -1), (2, 3), (1, 2), (-1, 2), (-2, 3),
(-2, -1), (0, -2)

QUESTION FOUR

The equation of a line is given by:

$$y = 8 - 4x$$

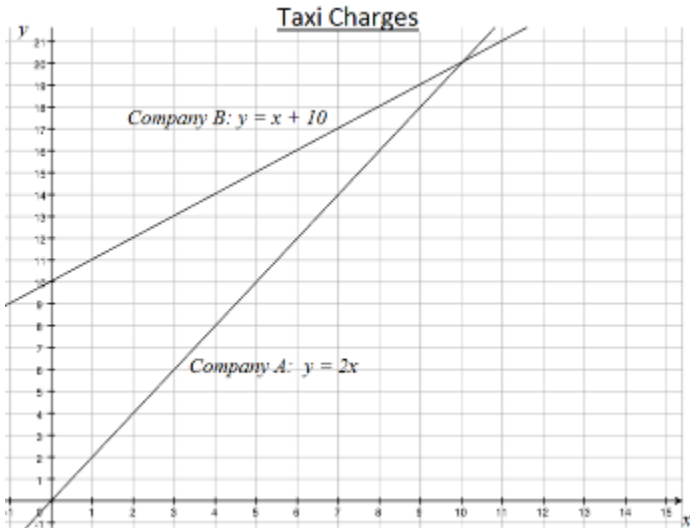
- (a) Draw the line on the axis below. [2]



- (b) What is the gradient of the line?

- (c) What is the x-intercept of the line?

QUESTION FIVE



This graph shows the charges of two taxi companies, where x = number of minutes and y = charge in \$.

The two equations are Company A: $y = 2x$ and Company B: $y = x + 10$.

- (a) Which company has a fixed charge as well as a charge based on how long you travel? How is this shown on the graph?

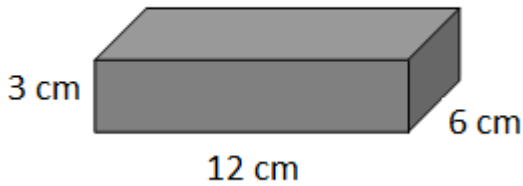
- (b) What is the price per minute charge for each company? How is this shown on the graph?

- (c) For what lengths of trip would Company B be the cheaper option? How is this shown on the graph?

Section 4 Measurement

QUESTION ONE

- (a) The cellphone comes packaged in a box with these dimensions:

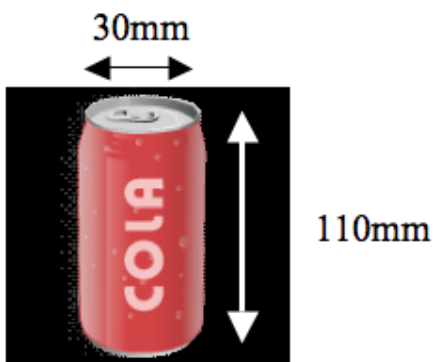


- (i) Calculate the volume of the box

- (ii) How many boxes of cellphones could be packaged in a carton that is cube-shaped, 60 cm in length, width and height?

QUESTION TWO

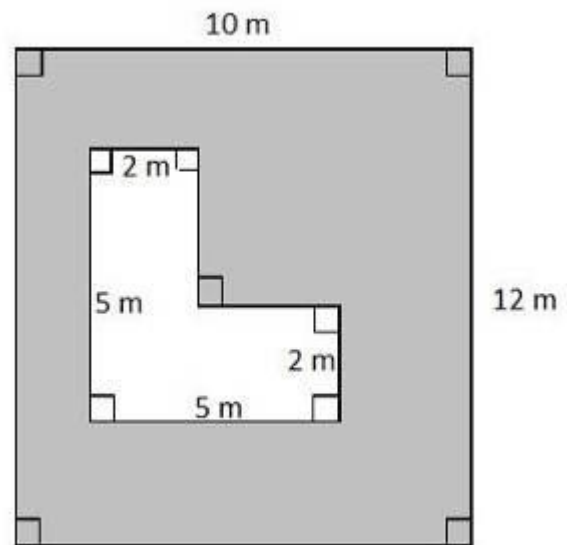
A typical cold drink can have a radius of 30mm and height of 110mm.



Calculate the volume of the can in .

- a) In mm^3
b) In cm^3

QUESTION THREE



A building contains an internal roofless courtyard that can only be accessed from the inside of the building. A basic floor plan is shown below.

- (a) Calculate the area of the floor space (shaded).

(b) Calculate the perimeter of the internal courtyard.

QUESTION FOUR

Convert the following:

(a) $6\text{m} = \underline{\hspace{2cm}} \text{cm}$

(b) $2.5\text{L} = \underline{\hspace{2cm}} \text{ml}$

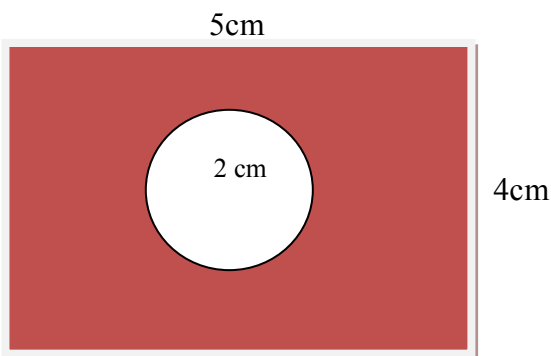
(c) $85\text{g} = \underline{\hspace{2cm}} \text{kg}$

(d) $1.7\text{km} = \underline{\hspace{2cm}} \text{m}$

QUESTION FIVE

Sam wants to build a circular pool on a rectangular piece of land that he has. A scale diagram is below.

Sam wants to put paving blocks around the pool (in the shaded area).



Scale: 1cm: 3m

(a) Calculate the area of the paving in m^2
Show all steps of working.

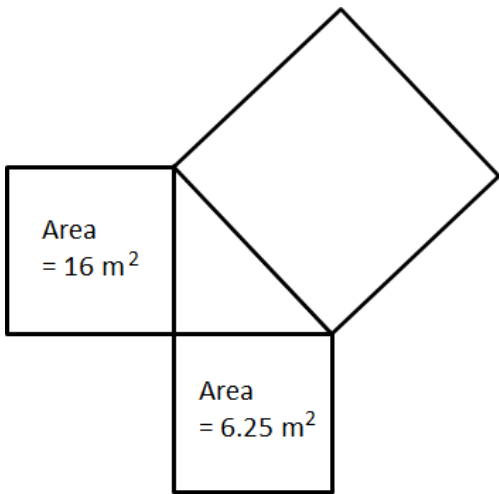
(b) Convert the area to hectares.

Section 5 Trigonometry

QUESTION ONE

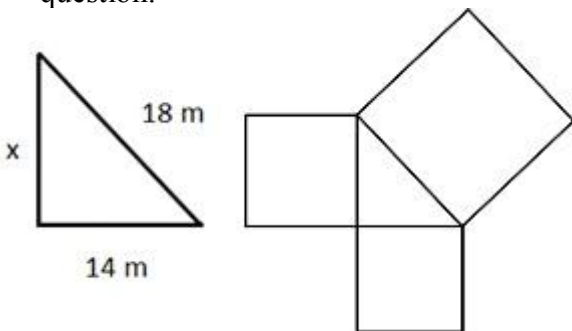
Samantha likes to work out Pythagoras questions by drawing squares on each side of the triangle and working out their area.

- (a) Write in the area of the largest square in the diagram



- (b) Give the lengths of all three sides of the original triangle

- (c) Samantha also wishes to work out this question:



- (i) Write the areas into the squares on the provided diagram.
 (ii) Give the length of side x . Write your working.

QUESTION TWO

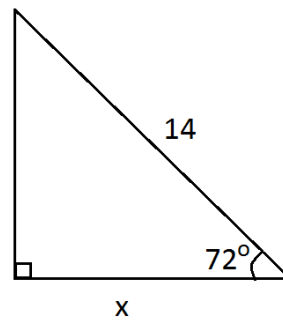
Use your calculator to give values for the following:

- (a) $\sin 56^\circ =$ _____
 (b) $\tan 32^\circ =$ _____
 (c) $\cos^{-1} 0.8 =$ _____
 (d) $\sin^{-1}(4 \div 10) =$ _____

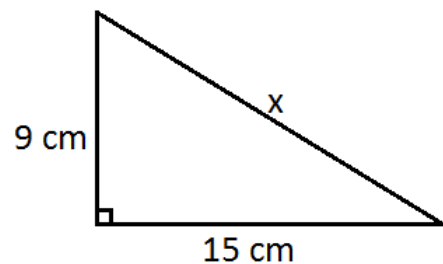
QUESTION THREE

Work out the missing sides or angles in these diagrams. Give at least 2 lines of working as well as your answer.

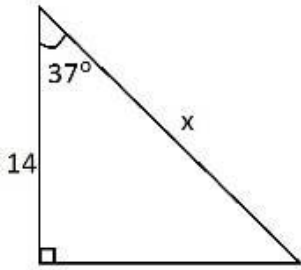
- (a)



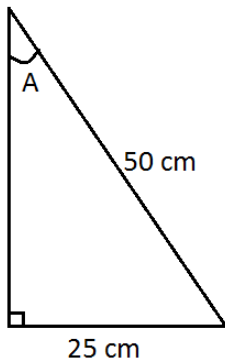
- (b)



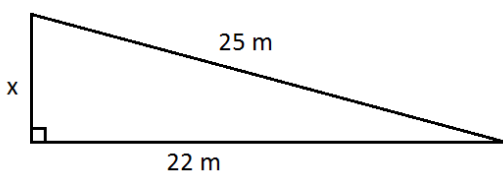
(c)



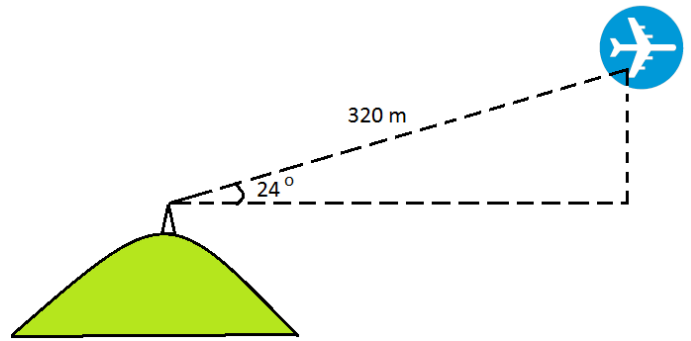
(d)



(e)



QUESTION FOUR



When an aeroplane was detected by a signal tower, it was 320 from the tower and at an angle of elevation of 24° . If the signal tower itself has an altitude of 200m, what is the altitude of the plane?

QUESTION FIVE

On a television race competition, a contestant is given this problem. They are near a statue that is 28 m high. They find that the angle of elevation from the ground to the top of the statue is 32° .

The contestant moves 20 m closer to the statue. To win the challenge, they must work out how far from the statue they now are (x) and what the new angle of elevation is (A) without taking any more measurements. Can you do this for them?

