General Mathematics - Practice Examination B

Please note … the format of this practice examination is different from the current format. The paper timings are different and calculators can be used throughout.

MATHEMATICS

Standard Grade - General Level

Time allowed - 1 hours 30 minutes

First name and initials

Surname

Class

Teacher

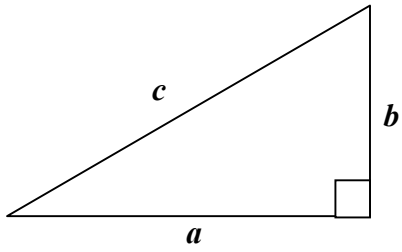
Read Carefully

1. Answer as many questions as you can.
2. Write your answers in the spaces provided .
3. Full credit will be given only where the solution contains appropriate working.
4. You may use a calculator

FORMULAE LIST

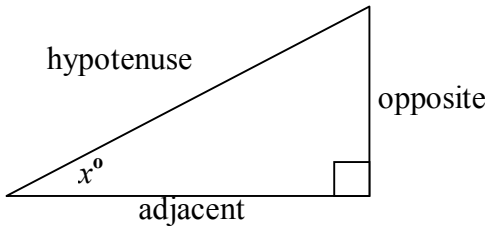
Circumference of a circle: $C = \pi d$
Area of a circle: $A = \pi r^2$
Curved surface area of a cylinder: $A = 2\pi r h$
Volume of a cylinder: $V = \pi r^2 h$
Volume of a triangular prism: $V = Ah$

Theorem of Pythagoras:



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

Trigonometrical ratios in a right angled triangle:

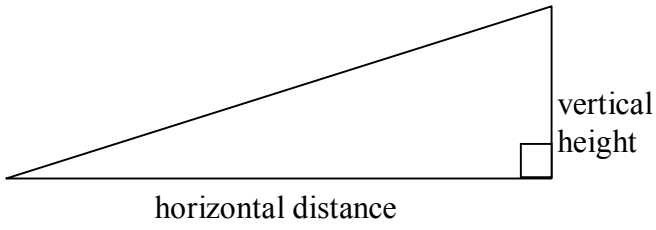


$$\tan x^o = \frac{\text{opposite}}{\text{adjacent}}$$

$$\sin x^o = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos x^o = \frac{\text{adjacent}}{\text{hypotenuse}}$$

Gradient:



$$\text{Gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}$$

	KU	RA

1. Solve **algebraically** the inequality

$$2(5x - 2) < 16$$ **(3)**

2. The planet Venus is 108 million kilometres from the sun.
Write this number in standard form **(2)**

3. Barbara and Ken are getting married. They have a list of the presents they would like in ***Littletrees*** department store. Here is part of the list :

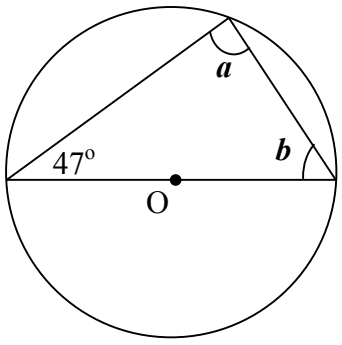
Barbara ~Ken Wedding List	
Item	***cost(£)***
clock radio	7
set of glasses	15
6 mugs	8
small lamp	12
set of towels	20
toaster	10
set of pots	18
cutlery set	15

Mr & Mrs Payne would like to buy them gifts which exactly total £30.
Show in the table five different ways that they could spend their money.

cutlery	pots	toaster	towels	lamp	mugs	glasses	radio
					√	√	√

(5)

4.



O is the centre of the circle.

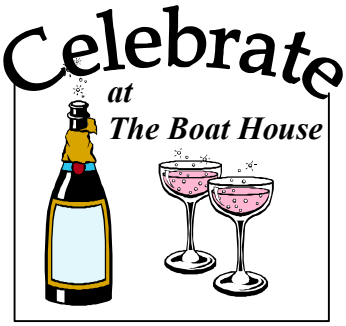
Write down the sizes of the angles marked ***a*** and ***b***. **(3)**

	KU	RA

5. The cost, £C, of arranging a celebration dinner at the Boat House Hotel is given by

$$C = 50 + 25n + 20b$$

where n is the number of people and b is the number of bottles of champagne ordered.



(a) (i) Find the total cost of a dinner if 40 people attended and 8 bottles of champagne were ordered. **(2)**

(ii) What was the mean cost per person ? **(3)**

(b) A bowling club with 110 members has £3200 to spend on a celebration dinner. How many bottles of champagne can they order ? **(3)**

6. Mike is moving house and decides to pack his collection of Maths books into cardboard boxes measuring 60 cm by 45 cm by 35 cm.
All his books are the same size and measure 15 cm by 20 cm by 5 cm.

(a) What is the maximum number of books he can pack into a box ? **(3)**

(b) If each book weighs 800g and the empty box weighs 300g, what is the total weight of the box, in kilograms, when it is full of books ? **(3)**

KU	RA

7. Mike needs to hire a van for his move to a new house. He makes enquiries from 2 firms and finds that the costs are as follows

VG Van Hire : £50 + £1 per mile

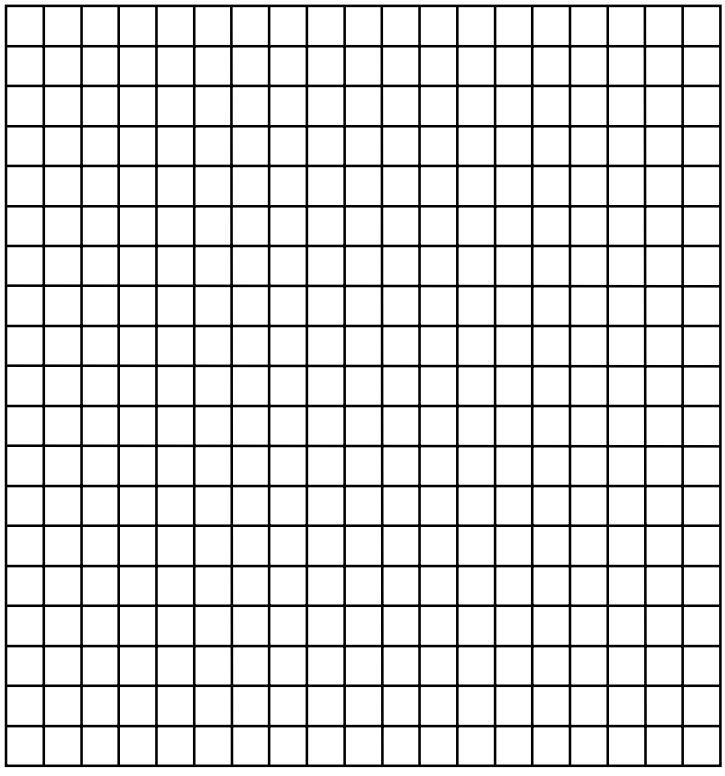
Hasty Hires : £30 + £1.50 per mile

(a) Complete the tables for the costs for each firm. **(4)**

VG Van Hire						
Number of miles	**10**	**20**	**30**	**40**	**50**	**60**
Cost (£)	**60**			**90**		

Hasty Hires						
Number of miles	**10**	**20**	**30**	**40**	**50**	**60**
Cost (£)	**45**		**75**			

(b) Draw the graphs for both firms on the same grid below. **(3)**



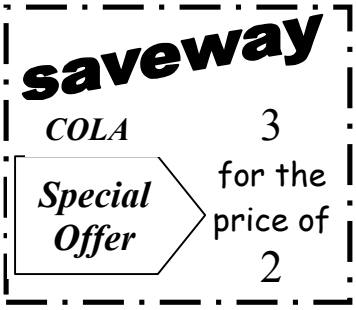
(c) If Mike estimates he will travel 25 miles altogether, which firm should he choose ? **(1)**

(d) If he thinks his total mileage will be 150 miles which firm will be best ? **(1)**

	KU	RA

8. Factorise fully $12x - 4y$ **(2)**

9. Three local stores are running special offers on bottles of cola.



Mark is having his friends to visit and wants 6 bottles of cola.

(a) Which of the above stores would offer him the best value for money if a bottle of cola is normally priced at £1.24 ?
(Give reasons for your answer) **(7)**

(b) How much will he save on the cost of buying 6 bottles at the normal price if he buys his cola from the best value store ? **(2)**

10. Philip sees an advert for loans in a Sunday newspaper.
The repayments for the loan are 48 monthly instalments of £94.66.

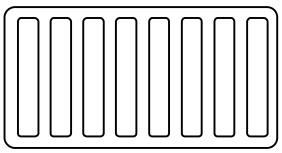
(a) What is the total amount that Philip has to repay ? **(2)**

(b) How much extra does he pay ? **(1)**

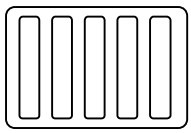
(c) What percentage is this of the original loan ?
(give your answer to the nearest 1%) **(2)**

KU	RA

11. The heat output (U kW) of a radiator is in direct proportion to the surface area (A cm^2).
The heat output of ***radiator A*** **,** which measures 120 cm by 75 cm, is 3 kW.



radiator A

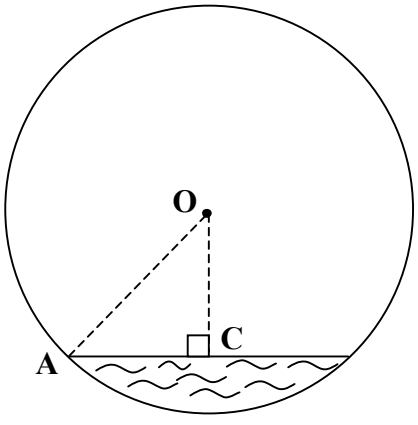


radiator B

Calculate the heat output for ***radiator B*** which measures 72 cm by 50 cm. **(6)**

12. The average speed of the ***Eurostar*** between London and Paris is 90 miles per hour.
The length of the journey is 498 miles.
If I leave London at 7.15 am, what time will I arrive in Paris, given that France is 1 hour ahead of UK time ? **(4)**

13.



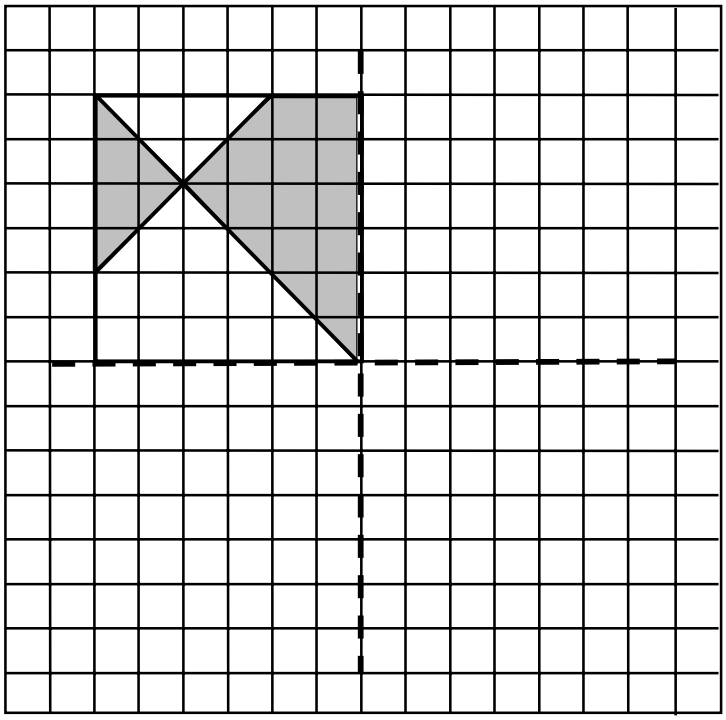
The diagram shows a section of a drain whose diameter is 1 metre. The surface width of the water in the drain is 70 cm.

(a) Write down the length of OA in centimetres. **(1)**

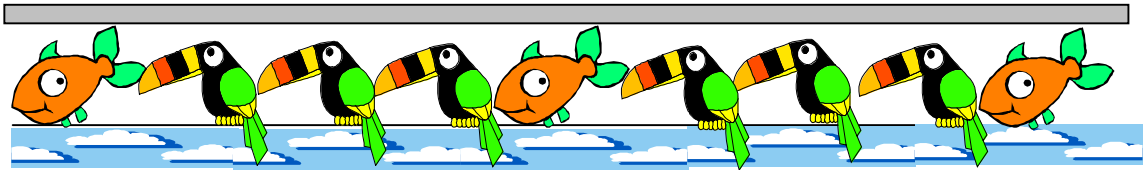
(b) Calculate how far the water level is below the centre of the pipe, O. (Give your answer to the nearest centimetre) **(4)**

KU	RA

14. The basic design for a floor tile is shown below. The designer wants to make a larger tile that has 2 lines of reflection symmetry.
Complete his design. **(4)**



15. The strip for fastening babies' nappies is printed with colourful animals. It is manufactured in one long piece and then cut to size.
Part of one of the strips is shown below.



(a) Complete the table for the pattern shown **(3)**

number of fish (F)	**2**	**3**	**4**	**5**	**6**		**10**
number of birds (B)	**3**		**9**				

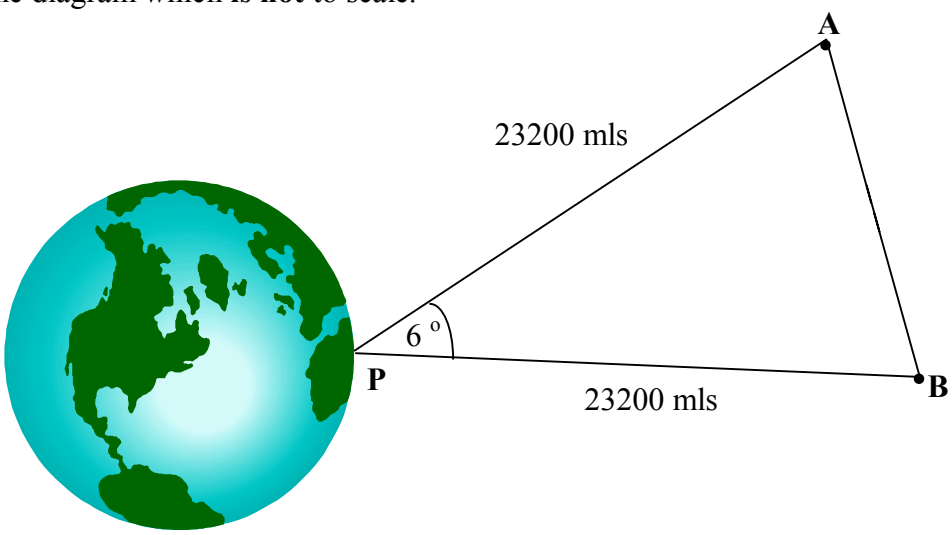
(b) Write down a formula for the number of birds, B, when you know the number of fish, F. **(2)**

(c) How many birds would there be if there were 20 fish ? **(2)**

(d) How many fish would there be for 30 birds ? **(3)**

	KU	RA

16. Two satellites A and B are orbiting the Earth. They are both observed at a distance of 23,200 miles from a fixed position on Earth (P). The angle between them is 6 ^{o} as shown in the diagram which **is not** to scale.



(a) What type of triangle is PAB ? **(1)**

(b) Calculate the distance between A and B.
(Give your answer correct to the nearest mile) **(6)**

17. (a) Calculate (i) $(1 + 2 + 3)$ **(1)**

(ii) $(1^3 + 2^3 + 3^3)$ **(2)**

(b) Describe any relationship between the two answers. **(1)**

(c) Calculate (i) $(1 + 2 + 3 + 4)$ **(1)**

(ii) $(1^3 + 2^3 + 3^3 + 4^3)$ **(2)**

(d) Describe this relationship. **(1)**

End of Question Paper

General Mathematics - Practice Exam A Marking Scheme

1. For $10x - 4 < 16$ . ..... (1)
$10x < 20$ ..... (1)
$x < 2$ ……. (1) **[3 marks KU]**

2. 1.08×10^8 ……. (1) for number
……. (1) for power of 10 **[2marks KU]**

3.

cutlery	pots	toaster	towels	lamp	mugs	glasses	radio
					√	√	√
		√		√	√		
√						√	
		√	√				
	√			√			
√					√		√

(1) each
or any other acceptable possibility **[*5 marks RA*]**

4. For $\boldsymbol{a} = 90^o$ (angle in a semi-circle) …… (1)
For $\boldsymbol{b} = [180 - (47 + 90)]^o$ …… (1)
$= 43^o$ …… (1) **[3 marks KU]**

5. (a) i) $C = 50 + (25 \times 40) + (20 \times 8)$ ……. (1)
$= 1210$ ..... (1) **[2 marks KU]**

ii) mean cost $= \dfrac{total\ cost}{number\ of\ people}$ ……. (1)

$= \dfrac{£1210}{40}$ ……. (1)

$= £30.25$ ……. (1) **[3 marks KU]**

(b) $3200 = 50 + (25 \times 110) + 20b$……. (1)
$3200 = 2800 + 20b$
$400 = 20b$ ……. (1)
$b = 20$
Twenty bottles of champagne can be ordered. ... (1) **[*3 marks RA*]**

6. (a) Number of books $= \dfrac{60}{20} \times \dfrac{45}{15} \times \dfrac{35}{5}$ ……. (1)
$= 3 \times 3 \times 7$ ……. (1)
$= 63$ ……. (1) **[3 marks KU]**
(*pupils may find an arrangement which is not the max. ⅔ marks*)

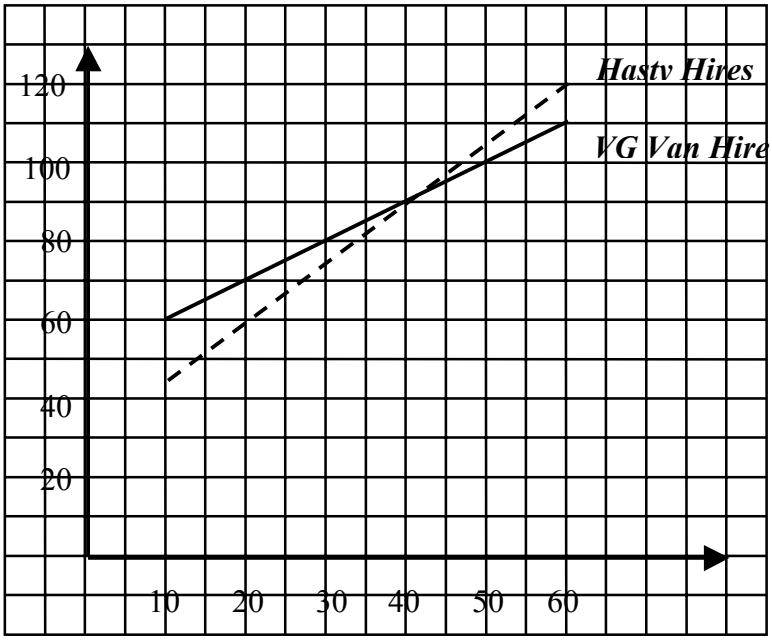
(b) weight of books $= 63 \times 800$g
$= 50400$g ……. (1)
weight of box + books $= 50400 + 300$
$= 50700$g ……. (1)
$= 5.07$ kg ……. (1) **[*3 marks RA*]**

7. (a)

VG Van Hire						
Number of miles	10	20	30	40	50	60
Cost (£)	60	**70**	**80**	90	**100**	**110**
Hasty Hires						
Number of miles	10	20	30	40	50	60
Cost (£)	45	**60**	75	**90**	**105**	**120**

[4 marks KU]

(b)



(1) for axes
(2) for lines

[3 marks KU]

(c) Hasty Hires ……. (1)

(d) VG Van Hire ……. (1) **[*2 marks RA*]**

8. (a) $12x - 4y = 4(3x - y)$ ..... (1) for common factor 4
..... (1) for remaining bracket **[2 marks KU]**

9. (a) Saveway : 3 for 2 ⇒ 6 for 4 ……. (1)
$4 \times £1.24 =$ **£4.96** ……. (1)
Winterfield : 3 bottles costs £2.51
6 bottles cost $2 \times £2.51$
= **£5.02** ……. (1)
Freshco : Buy 3 get 3 at ½ price ……. (1)
$3 \times £1.24 = £3.72$
$3 \times £0.62 = £1.86$ ……. (1)
total = **£5.58** ……. (1)

Best value for money – **Saveway** ……. (1) **[*7 marks RA*]**

(b) $6 \times £1.24 = £7.44$ Saving = £7.44 – £4.96 ……. (1)
= £2.48 ……. (1) **[2 marks KU]**

10. (a) For £94.66 × 48 ..... (1)
= £4543.68 ..... (1)

(b) £4543.68 – £3000 = £1543.68 ..... (1)

(c) $\frac{1543.68}{3000} \times 100$ ..... (1)
= 51% ..... (1) **[5 marks KU]**

11. Area of radiator A = 9000 cm^2 ..... (1)

$U \propto A$
$U = kA$ ..... (1)
$3 = 9000 \times k$
$k = 1/3000$ ..... (1)

$U = \frac{1}{3000} A$ ..... (1)

Area of radiator B = 3600 cm^2 ..... (1)

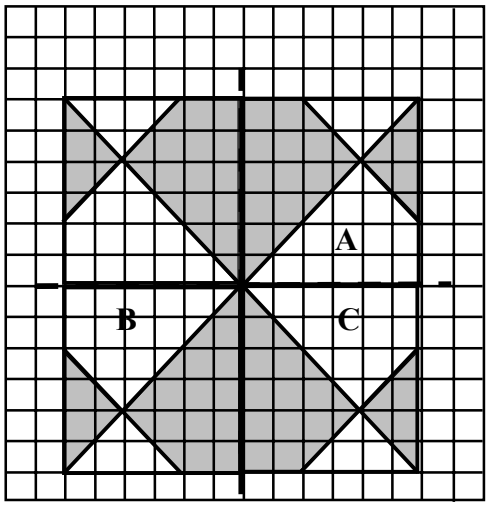
$U = \frac{1}{3000} \times 3600$
= 1.2 kW ..... (1) **[6 marks KU]**

12. $T = \frac{D}{S} = \frac{498}{90}$ ..... (1)
= 5.53 h
= 5 h 32 min ..... (1)

Arrival (UK time) = 7.15 am + 5 h 32 min
=12.47 pm ..... (1)
Arrival (French time) = 12.47 pm + 1 h
= 1.47 pm ..... (1) **[*4 marks RA*]**

13. (a) For OA = 50 cm ..... (1) **[1 mark KU]**
$OA^2 = OC^2 + AC^2$ ..... (1) or knowing to use Pythagoras
$OC^2 = 50^2 – 35^2$
= 1275 ..... (1)
OC = 35.7 ..... (1)
= 36 cm to the nearest cm ….. (1) **[*4 marks RA*]**

14.



(1) for reflection **A**

(1) for reflection **B**

(2) for reflection **C**

[*4 marks RA*]

15. (a)

number of fish (F)	2	3	4	5	6	10
number of birds (B)	3	6	9	12	15	27

(2) for 4,8,10
(1) for 18
[3 marks KU]

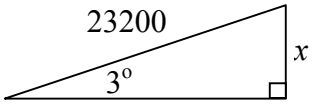
(b) $B = 3F - 3$ ……. (2)

(c) $B = (3 \times 20) - 3$ ……. (1)
$= 57$ ……. (1)

(d) $30 = 3F - 3$ ……. (1)
$33 = 3F$ ……. (1)
$F = 11$ ……. (1) **[*7 marks RA*]**

16. (a) For isosceles ……. (1) **[1 mark KU]**

(b) For knowing to split isosceles triangle into rt ∠'d triangles ……. (1)



……. (1)

$\sin 3^o = \dfrac{x}{23200}$ ……. (1)

$x = 1214.2$ ……. (1)

distance AB $= 2 \times 1214.2 = 2428.4$ ……. (1)
$= 2428$ mls to the nearest mile. ……. (1) **[*6 marks RA*]**

17. (a) (i) 6 ……. (1)
(ii) 36 ……. (2) **[3 marks KU]**

(b) $6^2 = 36$ (or 6×6) ……. (1) **[*1 mark RA*]**

(c) (i) 10 ……. (1)
(ii) 100 ……. (2) **[3 marks KU]**

(d) $10^2 = 100$ ……. (1) **[*1 mark RA*]**

Totals

K U	R A
49	***47***