

Credit Mathematics - Practice Examination G

Please note ... the format of this practice examination is the same as the current format. The paper timings are the same, as are the marks allocated.

Calculators may only be used in Paper 2.

MATHEMATICS

Standard Grade - Credit Level

Paper I

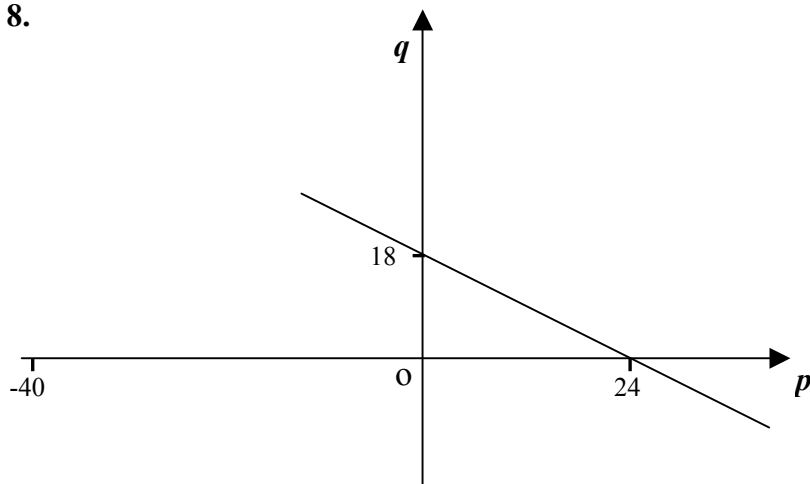
Time allowed - 55 minutes

Read Carefully

1. Answer as many questions as you can.
2. Full credit will be given only where the solution contains appropriate working.
3. **You may not use a calculator**

KU	RE
4	
	3
	5
	4
	4

8.



The straight line in the diagram shown passes through 24 and 18 on the p and q axes respectively.

- (a) Find the equation of the line in terms of p and q .
- (b) Does the point A(4,12) lie above or below the line?
Give a reason for your answer.



9. Two adults and three children pay £17.40 for admission to their local school concert.

One adult and two children pay £10.20 for admission to the same concert.

How much would 3 adults and 1 child have to pay to be admitted to the concert ?

10. Two functions are defined as follows :

$$f(x) = x^2 + 2x - 6$$

$$g(x) = 7x + 8$$

Find the value(s) of x for which $3(f(x)) + g(x) = 0$.

11. Megan conducted a survey.
She asked her school friends how they travelled to their Summer holiday.

Here are their answers:

Coach	12
Car	8
Aeroplane	7
Boat	3

Draw an appropriate statistical diagram to illustrate this information

End of Question Paper

	Give 1 mark for each •	Illustration(s) for awarding each mark
1.	<p>ans: 13.2 2 KU</p> <ul style="list-style-type: none"> •1 know order of calculations •2 carry out calculations 	<ul style="list-style-type: none"> • 1 $4 \cdot 5 \div 0 \cdot 5 = 9$ • 2 answer
2.	<p>ans: $\frac{32}{21}$ or $1\frac{11}{21}$ 2 KU</p> <ul style="list-style-type: none"> •1 changing to improper fractions and changing to multiplication •2 evaluate 	<ul style="list-style-type: none"> • 1 $\frac{8}{3} \times \frac{4}{7}$ • 2 answer
3.	<p>ans: 0, 1, 2, 3 4 KU</p> <ul style="list-style-type: none"> •1 removing brackets •2 collecting like terms •3 solving inequation •4 stating solution 	<ul style="list-style-type: none"> • 1 $4 - 6x + 8 \geq 1 - 3x$ • 2 $- 3x \geq -11$ • 3 $x \leq \frac{11}{3}$ • 4 answer
4.	<p>ans -26 2KU</p> <ul style="list-style-type: none"> •1 correctly substituting •2 evaluate expression 	<ul style="list-style-type: none"> • 1 $\frac{36+16}{-2}$ • 2 answer
5.	<p>(a) ans: $(2x - 3)(x + 4)$ 2KU</p> <ul style="list-style-type: none"> •1 & 2 factorising correctly <p>(b) ans: $\frac{x - 4}{2x - 3}$ 2KU</p> <ul style="list-style-type: none"> •1 factorising numerator •2 simplifying fraction 	<ul style="list-style-type: none"> • 1 $(2x - 3)$ • 2 $(x + 4)$ • 1 $(x + 4)(x - 4)$ • 2 answer
6.	<p>ans: $a = 0.5, b = 2$ 2KU</p> <ul style="list-style-type: none"> •1 recognizing max/min •2 recognizing period 	<ul style="list-style-type: none"> • 1 $a = 0.5$ • 2 $b = 2$

	Give 1 mark for each •	Illustration(s) for awarding each mark
7.	<p>ans: 24cm 4KU</p> <ul style="list-style-type: none"> •1 recognising similar triangles •2 calculating scale factor •3 calculating RQ •4 calculating TQ 	<ul style="list-style-type: none"> • 1 $\frac{PQ}{TS} = \frac{PR}{RS} = \frac{QR}{RT}$ • 2 S.F. = $\frac{3}{5}$ • 3 $RQ = \frac{3}{5} \times 15 = 9$ • 4 $TQ = 9 + 15 = \text{answer}$
8.	<p>(a) ans: $q = -\frac{3}{4}p + 18$ 4 KU</p> <ul style="list-style-type: none"> •1 knowing how to calculate gradient •2 correctly calculating gradient •3 finding y intercept •4 stating equation in terms of p and q <p>(b) ans: below the line. 3 RE</p> <ul style="list-style-type: none"> •1 substituting $p = 4$ into line equation •2 comparing y coordinates •3 conclusion 	<ul style="list-style-type: none"> • 1 $m = \frac{\text{vert}}{\text{horiz}}$ or equivalent • 2 $m = -\frac{3}{4}$ • 3 $c = 18$ • 4 answer <ul style="list-style-type: none"> • 1 $q = -\frac{3}{4}(4) + 18 = 15$ • 2 $12 < 15$ • 3 conclusion
9.	<p>ans: £15.60 5 RE</p> <ul style="list-style-type: none"> •1 creating two equations •2 knowing to solve system of equations •3 evaluating one variable •4 evaluating second variable •5 calculating cost 	<ul style="list-style-type: none"> • 1 $2A + 3C = 17.40$ $A + 2C = 10.20$ • 2 solving simultaneously • 3 $A = 4.20$ • 4 $C = 3.00$ • 5 $3(\pounds4.20) + \pounds3.00 = \text{answer}$
10.	<p>ans: $x = -5, \frac{2}{3}$ 4 RE</p> <ul style="list-style-type: none"> •1 substituting correctly •2 creating standard quadratic equation •3 factorising •4 solving equation 	<ul style="list-style-type: none"> • 1 $3(x^2 + 2x - 6) + 7x + 8 = 0$ • 2 $3x^2 + 13x - 10 = 0$ • 3 $(3x - 2)(x + 5) = 0$ • 4 answer
11.	<p>Barchart, Histogram or Pie-chart 4 RE</p>	<p>Take account of e.g. proper scales, correct height of bars, proper spacing etc</p>

Total : KU 24 RE 16

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Calculators may be used in this paper.

MATHEMATICS

Standard Grade - Credit Level

Paper II

Time allowed - 80 minutes

Read Carefully

1. Answer as many questions as you can.
2. Full credit will be given only where the solution contains appropriate working.
3. **You may use a calculator**

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: Area = $\frac{1}{2}ab \sin C$

Standard Deviation: $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$

KU	RE
	3
	3
	4
	5

1. The circumference of the earth is approximately 4.01×10^4 km.

Calculate, correct to three significant figures, the radius of the earth, expressing your answer in standard form.



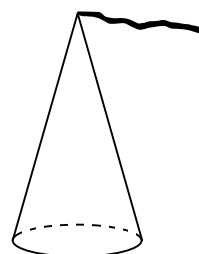
2. House prices are predicted to rise approximately 2.5% per year, for the next few years.
A cottage bought in January 2002 cost £87 000.
How much, to the nearest £, would the same cottage be worth in January 2005 ?

3. Solve the equation

$$2x^2 + 4x - 3 = 0.$$

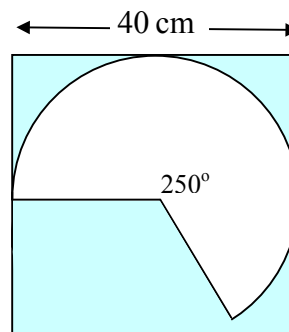
Give your answers **correct to 1 decimal place**.

4. Primary 7 are making medieval hats as part of their History project.
A few of the girls decide to make a hat like the one shown, which consists of a cone shaped body made of card with a ribbon attached to the top.



The sector of card used to make the cone is cut from a **square** piece of card of side 40 cm as shown.

If the angle at the centre of the sector is 250° , calculate the percentage of card wasted, to the nearest percent.

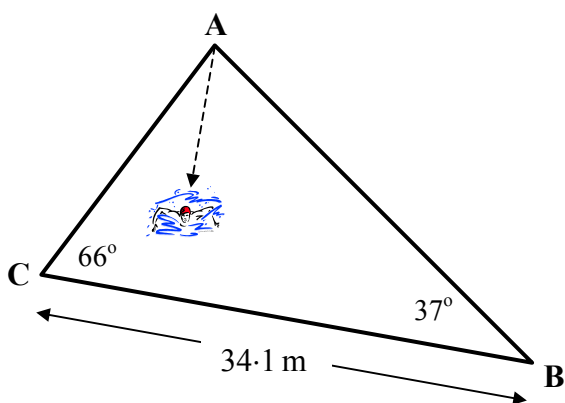


KU	RE
3	
	5
3	
2	
	3

5. Solve, **algebraically**, the equation

$$5 \cos x^\circ + 3 = 0, \text{ for } 0 \leq x < 360.$$

6. In the triangular shaped swimming pool shown below a swimmer dives in at **A** and swims directly to the opposite side **BC**. Angle $ABC = 37^\circ$ and angle $BCA = 66^\circ$. The length of BC is 34.1 metres.



Calculate, correct to three significant figures, the shortest possible distance the swimmer has to cover.

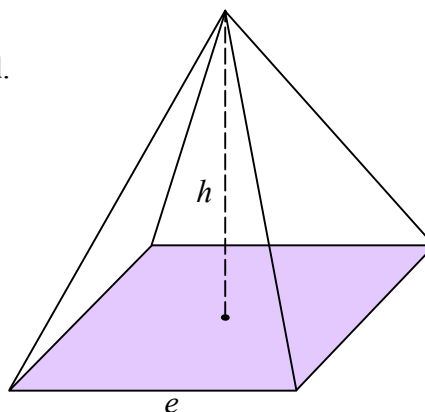
7. (a) Express $\frac{6x}{y(x-2y)} - \frac{6}{y}$ as a single fraction in its simplest form .

- (b) Change the subject of the formula to H in $V = d^2 \sqrt{H}$

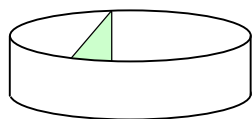
8. The volume of a square based pyramid, of base side e and height h , as shown, is given by the formula $V = \frac{1}{3}e^2 h$.

The base length is **doubled** and the height is **halved**.

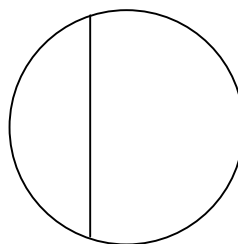
What happens to the volume of the cone ?



11. **KENNOLAUT**, the dog food specialists, have recommended that dogs should drink at least three times the volume of food they consume. To promote this the company have designed a new feeding dish with two sections, as shown in the diagrams below.



side and above view



top view

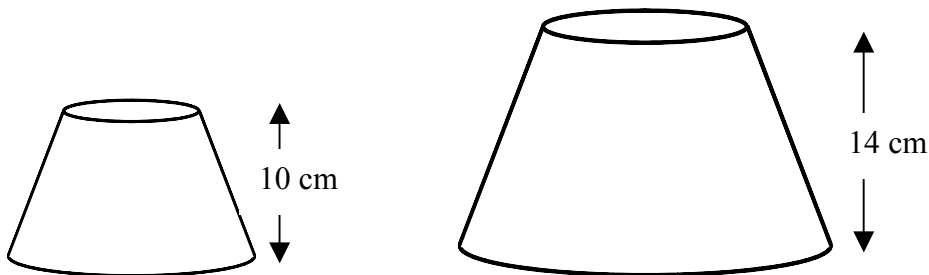
The larger section is for water and the smaller section is for food.

The dish is cylindrical in shape with a radius of 15 cm.
The dividing strip is 26 cm long.

If filled to capacity will the dish satisfy the company's recommendation?

6

12. A company sells boxed chocolates in two different sizes. The boxes are mathematically similar truncated cones, as shown in the diagram below.



The cost of the chocolates should be in direct proportion to their weight.

The chocolates in the larger box have been weighed and are priced at £5.45.

The company is considering pricing the smaller box at £2.25.

Is this a fair price ?

Your answer must be accompanied with appropriate working.

3

End of Question Paper

Give 1 mark for each •		
	<ul style="list-style-type: none"> • 1 using $d = \frac{C}{\pi}$ • 2 calculating radius • 3 answer in standard form 	<ul style="list-style-type: none"> • 1 $d = \frac{4.01 \times 10^4}{\pi} = 12764.23$ • 2 $r = \frac{12764.23}{2} = 6382.11$ • 3 answer
2.	<p>ans: £93689 3 KU</p> <ul style="list-style-type: none"> • 1 knowing 2.5% rise has M.F.= 1.025 • 2 knowing 3 years increase M.F. = 1.025³ • 3 calculating answer 	<ul style="list-style-type: none"> • 1 1.025 × £87000 • 2 1.025 × previous answer • 3 1.025 × previous answer
3.	<p>ans: 0.6 and -2.6 4 KU</p> <ul style="list-style-type: none"> • 1 identifying a, b, c • 2 substituting correctly into formula • 3 calculating one value • 4 calculating second value 	<ul style="list-style-type: none"> • 1 $a = 2, b = 4, c = -3$ • 2 $x = \frac{-4 \pm \sqrt{4^2 - 4 \times 2 \times -3}}{4}$ • 3 $x = 0.6$ • 4 $x = -2.6$
4.	<p>ans: 45% 5 RE</p> <ul style="list-style-type: none"> • 1 stating fraction • 2 calculating area of circle • 3 calculating area of sector • 4 calculating area of card not used • 5 calculating percentage 	<ul style="list-style-type: none"> • 1 $\frac{250}{360} = \frac{25}{36}$ • 2 $A = \pi \times 20^2$ • 3 $Sect = \frac{25}{36} \times A = 872.66$ • 4 $40^2 - 872.66 = 727.34$ • 5 $\frac{727.34}{1600} \times 100\%$
	<ul style="list-style-type: none"> • 1 rearranging to find $\cos x =$ • 2 identifying quadrants • 3 calculations 	<ul style="list-style-type: none"> • 1 $\cos x = -\frac{3}{5}$ • 2 2nd 180 – ans, 3rd 180 + ans • 3 answer

	Give 1 mark for each •	Illustration(s) for awarding each mark
6.	<p>ans: 19.2 m 5 RE</p> <ul style="list-style-type: none"> • 1 attempting to calculate side AC or AB • 2 calculating AC or AB using Sine Rule • 3 knowing shortest dist is at 90° to BC • 4 using SOH to calculate shortest dist • 5 calculating correctly 	<ul style="list-style-type: none"> • 1 $\frac{36.1}{\sin 77} = \frac{AC}{\sin 37} = \frac{AB}{\sin 66}$ • 2 AC = 21.1 m • 3&4 $\sin 66 = \frac{\text{dist}}{21.1}$ • 5 answer
7.	<p>(a) ans: $\frac{12}{x-2y}$ 3 KU</p> <ul style="list-style-type: none"> • 1 numerator • 2 denominator • 3 simplifying <p>(b) ans: $H = \frac{v^2}{d^4}$ 2 KU</p> <ul style="list-style-type: none"> • 1 removing root sign by squaring • 2 dividing 	<ul style="list-style-type: none"> • 1 $6x - 6(x - 2y) = 12y$ • 2 $y(x - 2y)$ • 3 answer <ul style="list-style-type: none"> • 1 $V^2 = d^4 H$ • 2 answer
8.	<p>ans: Volume is doubled 3 RE</p> <ul style="list-style-type: none"> • 1 replacing e with $2e$, and h with $\frac{1}{2}h$ • 2 simplifying expression • 3 conclusion 	<ul style="list-style-type: none"> • 1 $V = \frac{1}{3} \times (2e)^2 \times \left(\frac{1}{2}h\right)$ • 2 $V = \frac{2}{3}e^2h$ • 3 answer
9.	<p>(a) ans: Females 6, 16, 35, 52, 66, 70 Males 5, 13, 24, 44, 70, 81</p> <p>2 KU</p> <ul style="list-style-type: none"> • 1&2 knowing how to construct a cumulative frequency column 	<ul style="list-style-type: none"> • 1 Female column • 2 Male column

	Give 1 mark for each •	Illustration(s) for awarding each mark
9.	<p>(b) ans:</p> <p>Number Of Smokers</p> <p>Ages</p> <p>Males</p> <p>Females</p> <p>3 KU</p> <p>(c) ans: Statement 3 RE</p> <ul style="list-style-type: none"> 1 comparing totals 2 considering differences at different ages 3 recognising a critical age 	<ul style="list-style-type: none"> 1 axes labelled correctly 2 points plotted correctly 3 lines drawn and identified <ul style="list-style-type: none"> 1 more males smoked than females 2 up to age 17 there were more female smokers 3 at age 18 and over there were more male smokers
10.	<p>ans: 1270 cm³ 4 RE</p> <ul style="list-style-type: none"> 1 calculating volume of hemisphere 2 calculating volume of cone 3 calculating 24% 4 total volume to 3 sig figs 	<ul style="list-style-type: none"> 1 $V = \frac{1}{2} \times \frac{4}{3} \times \pi \times 8^3 = 1072.33 \text{ cm}^3$ 2 $V = \frac{1}{3} \times \pi \times 8^2 \times 12 = 804.25 \text{ cm}^3$ 3 $24\% = 193.02 \text{ cm}^3$ 4 $1265.35 = 1270 \text{ cm}^3$
11.	<p>ans : Yes . Vol of water > 3 × vol of food. 6 RE</p> <ul style="list-style-type: none"> 1 splitting the top view into two sectors, the smaller containing an isosceles triangle. 2 calculating the angle at the apex of isosceles triangle 3 calculating the area of the minor sector 4 calculating the area of the triangle 5 calculating area of the food section 6 comparing the areas of both sections 	<ul style="list-style-type: none"> 1&2 $\sin x = \frac{12}{15} \Rightarrow x = 60.07$ angle of minor sector = 120.1° 3 $\text{min sect} = \frac{120.1}{360} \times \pi \times 15^2 = 235.82$ 4 $\Delta = \frac{1}{2} \times 15 \times 15 \times \sin 120.1 = 97.33$ 5 food section = 138.49 cm² water section = 568.37 cm² 6 $3 \times 138.49 < 568.37$
12.	<p>ans: No, as £2.25 > £1.99 3 RE</p> <ul style="list-style-type: none"> 1 finding scale factor for reduction 2 calculating cost 3 comparing cost with £2.25 	<ul style="list-style-type: none"> 1 linear S.F. = $\frac{10}{14} = \frac{5}{7}$ 2 $\text{cost} = \left(\frac{5}{7}\right)^3 \times £5.45 = £1.99$ 3 answer

Total : KU 23 RE 29

For PI & PII

Totals : KU 47 RE 45