General Mathematics - Practice Examination C

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 hour 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.
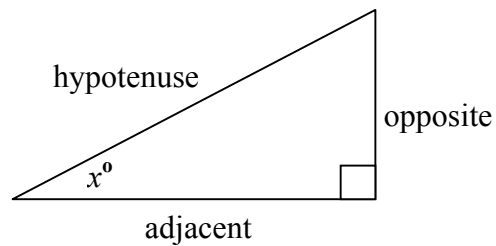4. You may use a calculator

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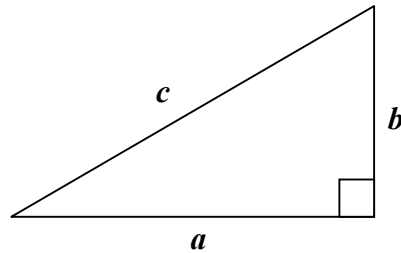
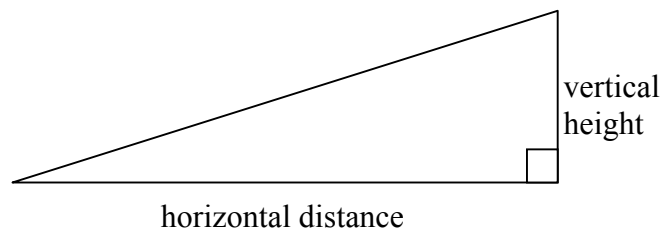$$a^2 + b^2 = c^2$$

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:

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

1.   A certain form of bacteria, when examined under a microscope, is found to
be 0·0012 cm in length.
Write this number in scientific notation.   **(2)**

2.   The table below shows the temperatures in 5 British cities on January 4th 1998 at 9 am.

City	Temperature
Aberdeen	-5 °C
Cardiff	1 °C
Glasgow	-1 °C
London	4 °C
Manchester	2 °C

(a)   By how many degrees was London warmer than Glasgow ?

(b)   By noon on January 4th the temperature in Glasgow had risen by 9°C.
What was the noon temperature in Glasgow ?

(1)

3.   Maggie earns a salary of £12,600 per year.
She is told that she will be receiving a salary increase of 7%.

(a)   Calculate Maggie's new salary.   **(3)**

(b)   Maggie is paid <u>monthly</u> and when she receives her wageslip she sees
that her gross monthly pay is £1062

Has Maggie been paid correctly ?
You must give a reason for your answer.   **(3)**

4. (a) On the grid below, plot the following points and join them up to form a triangle.

(2)

$$P (3 , 2) \quad Q (3 , -3) \quad R(-2 , -3)$$
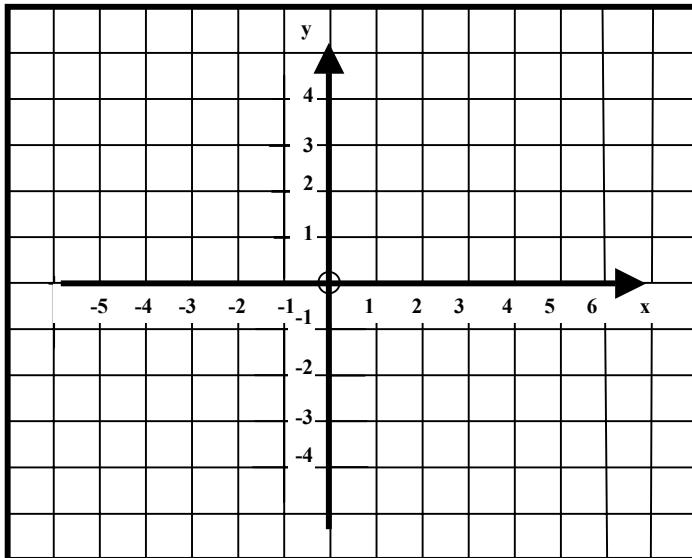
(b) Calculate the length of side PR.

(3)

5. Solve algebraically

$$5x - 4 = 2x + 20$$

(3)

6. The diagram shown is of a new design for a bedspread.
For each bedspread, a diamond is cut out of a plain
sheet of cloth and patterned material is sewn in its place.

(a)   Calculate the area of the diamond.

260 cm

112 cm

160 cm

(3)

(b)   Calculate the area of plain cloth remaining after the diamond
has been removed.

(2)

(c)   What **percentage** of the bedspread is plain material ?

(3)

7.   Simplify :-

(a) $4a + 6(5-a) - 20$ **(3)**

(b) $3b(b - 2)$ **(2)**

8. Complete the diagram below, by reflecting the flag in the dotted lines of symmetry.
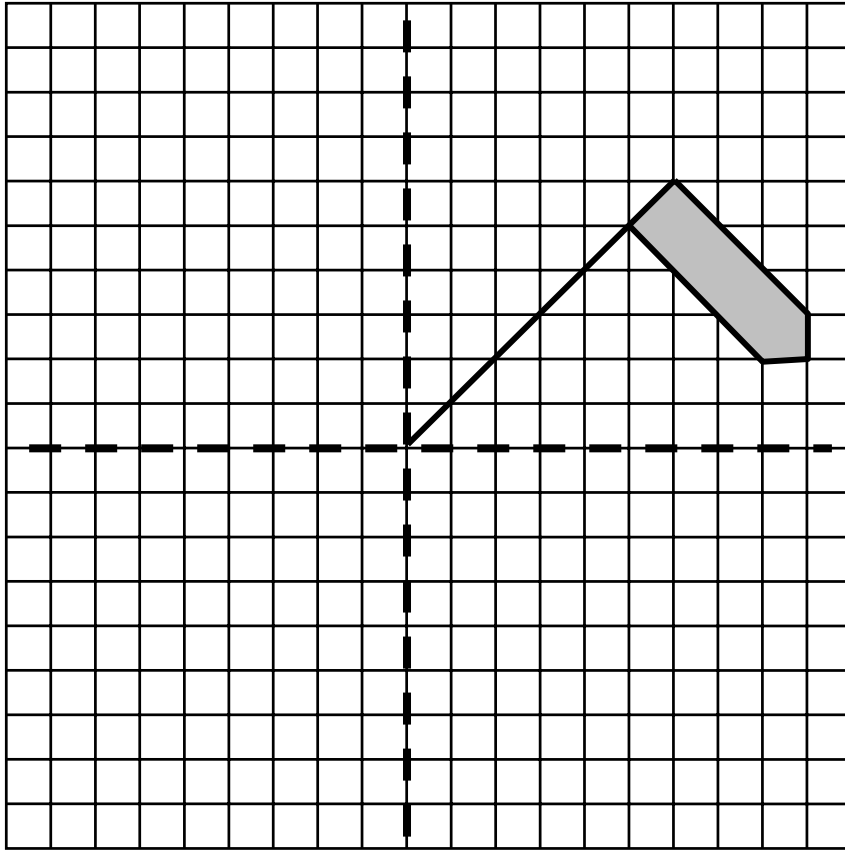
(3)

9. In the diagram below CB is a tangent to the circle.
Angle OAB is 50° and the line OC is parallel to AB.

Calculate the size of the angle x. **(3)**
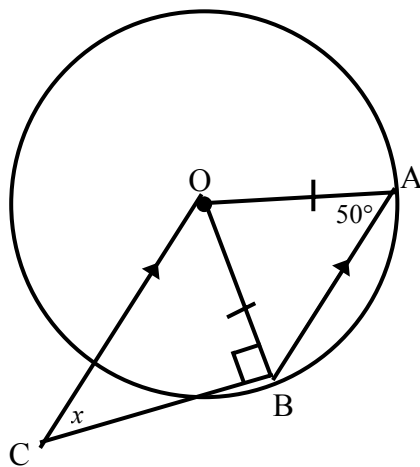
10. While on holiday Paul decides to calculate the height of his hotel.

He draws a sketch to help him.

Paul positions himself 3·4 metres away from a marked spot on the ground and he measures his own height to be 160 centimetres.

The hotel is 102 metres from the spot on the ground.
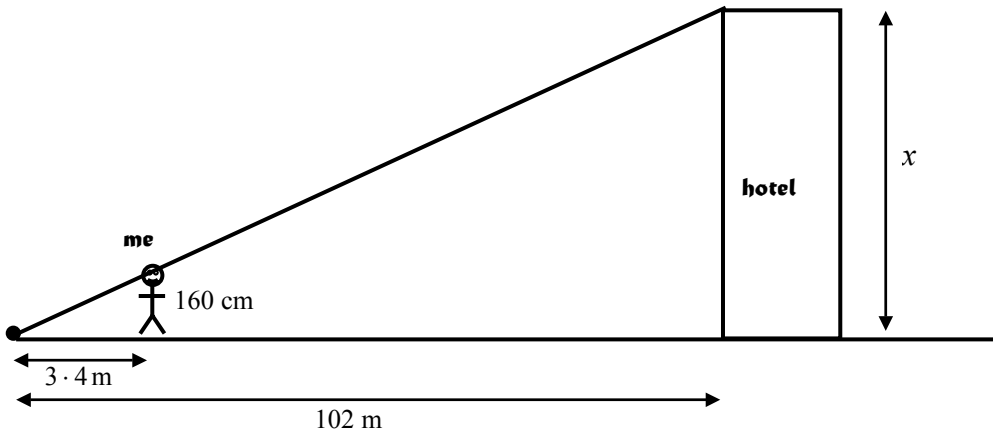
Assuming Paul uses a method involving similar triangles, what height will he calculate the hotel to be ?
You must not use a scale drawing.

(4)

11. A painter and decorator knows that he needs 42 litres of paint to paint a room.
He must use a mixture of blue and red paint in the ratio 3 : 4.

How many litres of red paint will the painter need ?

(3)

12. The distance time graph shows details of a coach journey on a weekend outing.
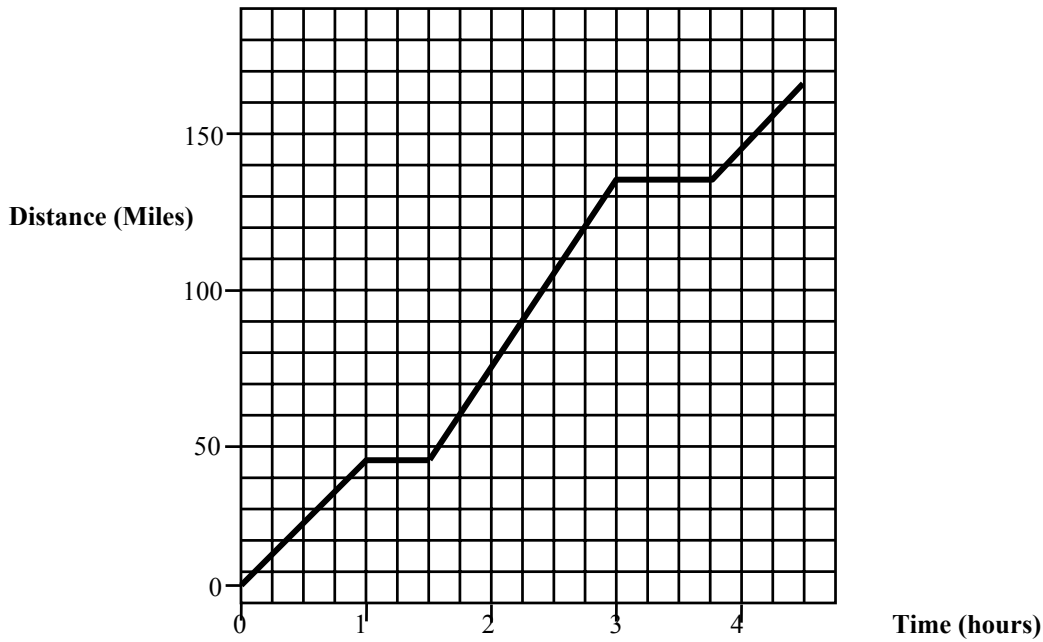
(a) How far did the coach travel before it stopped for the first time ? **(1)**

(b) Calculate the total driving time for the driver ? **(2)**

(c) Hence calculate the average speed of the coach for the whole journey, giving your answer in miles per hour. (do not include the stops). **(3)**

13.

80 cm

50 cm

The doormat shown above is made up from a rectangle and two semi circles.

(a)   A coloured border is to be put around the edge of the mat without any overlap.

Calculate the length of piping required for the border.   **(3)**

(b)   Calculate the area of the mat in **square metres**.   **(5)**

(c)   If the material used to make the mat costs £3.40 per square metre, and the coloured edging costs 90p per metre, find the **total** cost of making the mat.   **(4)**

14. An engineer planning a new suspension bridge decides to use the following design for the sides.
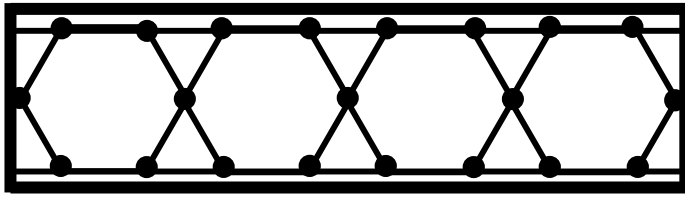
The side of the bridge is made up of steel hexagon shapes with bolts to hold them together.

The number of bolts needed depends on the number of hexagons used.

(a) Complete the table to help the engineer plan the bridge.

(3)

Number of hexagons (h)	1	2	3	4	5		10
Number of bolts (B)	6	11					

(b) Find a formula connecting the number of hexagons (h) with the number of bolts (B). **(2)**

(c) Is it possible for the engineer to build the bridge using 120 bolts ? **(3)**
You must explain your answer with appropriate working.

15. Barry needs new glasses.
He has seen a pair of frames that he likes in three different opticians.

Barry must also have an eye test which normally costs £12.

Specs R Us
Lenses and Frames £120

Spec Express
Lenses £30
Frames £100
Free Eye Test

S A L E
20% discount on all frames

Frames - £110
Lenses - £26
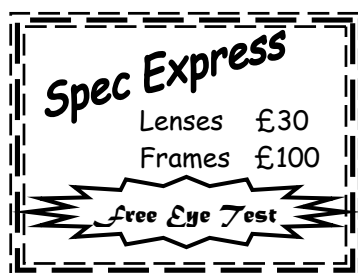
Obviously Barry wants the cheapest deal.

Which Opticians should Barry choose ?
Your answer must be accompanied with the appropriate working. **(6)**

16. A skateboard ramp has been designed to have the following dimensions :-

7 m

$x°$

15 m
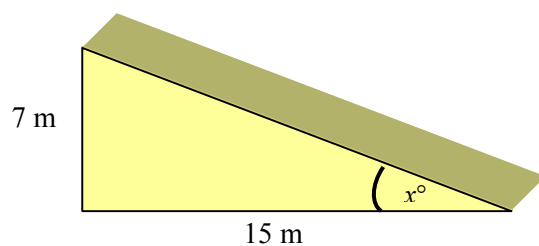
The ramp can only be used in competitions if the angle marked x is between 20 and 30 degrees.

Can this ramp be used in a competition ? **(4)**
You must show all your working.

END OF QUESTION PAPER

General Mathematics - Practice Exam C   Marking Scheme

1. $\underline{1.2 \times 10^{-3}}$ .... (1) for number
                                                      .... (1) for power of 10   **[2 marks KU]**

2.   (a)   For $4 - (-1)$
                    $= \underline{5°C}$ .... (1)

      (b)   For $-1 + 9$
                    $= \underline{8°C}$ .... (1)   **[2 marks KU]**

3.   (a)   For $0.07 \times £12600$ .... (1)
                    $= £882$ .... (1)

                    $£882 + £12600$
                    $= \underline{£13482}$ .... (1)   **[3 marks KU]**

      (b) $£1062 \times 12$ .... (1) for multiplying by 12
                    $= £12744$ .... (1)
                    (or $£13482 \div 12$ etc.)

      No. Maggie has been underpaid by £738 per year.   .... (1)   **[3 marks RA]**
                    (or £61.50 per month)

4.   (a)   For   plotting points   .... (1)
             For   joining points   .... (1)

      (b)   For $PR^2 = 5^2 + 5^2$ .... (1)
                    $= 50$ .... (1)
                    $\underline{PR = 7.1}$ .... (1) (any rounding ok)   **[5 marks KU]**

5.   For $3x - 4 = 20$ .... (1)
                    $3x = 24$ .... (1)
                    $\underline{x = 8}$ .... (1)   **[3 marks KU]**

6.   (a)   For $\dfrac{1}{2} \times 112 \times 260$ .... (2) (or equivalent)

                    $= \underline{14560 \text{ cm}^2}$ .... (1)   **[3 marks KU]**

      (b) $A_{rec} = 160 \times 260 = 41600 \text{ cm}^2$ .... (1)
             $A_{Plain} = 41600 - 14560$
             $= \underline{27040 \text{ cm}^2}$ .... (1)   **[2 marks RA]**

      (c) $\dfrac{27040}{41600} \times 100$ .... (2)

             $= \underline{65\%}$ .... (1)   **[3 marks RA]**

7.   (a)   For $4a + 30 - 6a - 20$ .... (1)

                        $\underline{10 - 2a}$ .... (1) For -2a

                                        .... (1) For 10

   (b)   For $\mathbf{\underline{3b^2 - 6b}}$ .... (1) For $3b^2$

                                        .... (1) For $-6b$ **[5 marks KU]**

8.
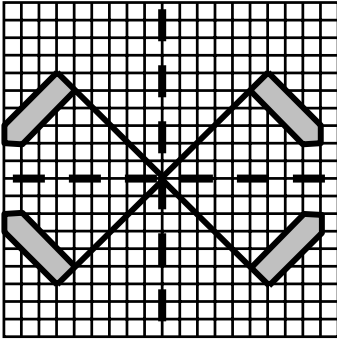
                                      .... (3)
                                  (1 mark for each correct quadrant)

                                             [3 marks KU]

9.   For $\angle$ OBA = 50°   .... (1)

             $\angle$ BOC = 50°   .... (1)

                $\underline{\mathbf{x = 40°}}$ .... (1)   **[3 marks KU]**

10.   For   knowing to change 160 cm into 1.6m   .... (1)

             scale factor $= \dfrac{102}{3 \cdot 4} = 30$ .... (2) (pupils may use equal fractions)

             Hotel $= 30 \times 1.6$
                $= \underline{\mathbf{48\ metres}}$ .... (1)   **[4 marks KU]**

11.   For   total parts $= 7$ .... (1)

             Red $= \dfrac{4}{7}$ of 42   .... (1) Award mark for $\dfrac{4}{7}$

               $= 6 \times 4 = \underline{\mathbf{24}}$ .... (1) For ans 24

                                                  [3 marks RA]

12.   (a)   40 miles   .... (1)   **[1 mark KU]**

   (b)   1 hr + 1.5 hr + 45 mins   .... (1)
           = 3 hrs 15 mins
           or **3.25 hrs**   .... (1)   **[2 marks RA]**

   (c) $S = \dfrac{D}{T} = \dfrac{160}{3.25}$ .... (1) For formula

                                      .... (1) For working

           $= \underline{\mathbf{49.2\ mph}}$ .... (1)   **[3 marks KU]**

13.   (a) $C = \pi d = \pi \times 50$ .... (1)

              $C = 157$ cm   .... (1)

              Perimeter $= 80 + 80 + 157$

                          $= \underline{\textbf{317 cm}}$ .... (1)   **[3 marks RA]**

     (b) $r = 25$ cm $= 0.25$ m   .... (1)

              $A_{circle} = \pi r^2 = \pi \times 0.25^2$ .... (1)

                    $= 0.2$ m^2 (0.196)   .... (1)

              $A_{rectangle} = 0.8 \times 0.5 = 0.4$ .... (1)

              $A_{total} = 0.4 + 0.2 \approx \underline{0.6 \text{ m}^2}$ .... (1)   **[5 marks RA]**

     (c)   For using 3.17 metres   .... (1)

              For $3\cdot17 \times 0.90 = $ £2.85   .... (1)

              For $0\cdot6 \times 3.40 = $ £2.04   .... (1)

              For final answer .... <u>£4.89</u>   .... (1)   **[4 marks RA]**

14.   (a)

h	1	2	3	4	5		10
B	6	11	**16**	**21**	**26**		**51**

              ...... (2) for 16, 21, 26

              ..... (1) for 51   **[3 marks KU]**

     (b) $\underline{\textbf{\textit{B} = 5\textit{h} + 1}}$ .... (2)   **[2 marks RA]**

     (c) $120 = 5h + 1$ .... (1)

              $5h = 119$ .... (1)

              $\underline{\textbf{\textit{h} = 23.8}}$ **<u>no it is not possible.</u>**   .... (1)   **[3 marks RA]**

15.   Specs R Us   :   £120 + £12

                               $= \textbf{£132}$ .... (1)

            Spec Express   :   **£130**   .... (1)

            Vision Direct   :   20% of £110

                               $= $ £22   .... (1)

                               frames $= $ £88   .... (1)

                               88 + 26 + 12

                               $= \textbf{£126}$ .... (1)

           <u>So Vision Direct is the cheapest</u>   .... (1)   **[6 marks RA]**

16.   For   knowing to use tan   .... (1)

              $\tan x = \dfrac{7}{15} \approx 0\cdot47$ .... (1)

                $x = 25.2°$ .... (1)

              <u>Yes the ramp can be used.</u>   .... (1)   **[4 marks RA]**

TOTAL KU = 40   **TOTAL RA = 40**