Welcome to Godalming College Maths Department

Please complete the Essential Skills Exercises on separate paper, mark them from the answers at the back of this booklet and bring them to your first Maths lesson in September. You must also show your workings! There will be a test on this work early in the course so please take your time with it.

Essential Skills Exercises

As the title suggests, these skills are absolutely vital if you are to be successful at A-level Maths. Please spend some quality time on this work. There are some notes on Godalming Online which may help you or you can use your school notes. **You must show all your workings!** Please bring the completed exercises with you to your first Maths lesson. You should only need a calculator for sections K, N and O.

A. Evaluating Indices:

Find the value of the following, without using a calculator:

1. 2^3 **2.** 3^4 **3.** 1^3 **4.** $\left(\frac{2}{3}\right)^2$ **5.** 2^{-3} **6.** 7^0

7. 0.7^1 **8.** 5^{-2} **9.** $8^{2/3}$ **10.** $16^{-3/2}$

B. Simplifying Expressions with Indices:

Simplify each of the following:-

1. $y^2 \times y^5$ **2.** $3y^3 \times y^{-4}$ **3.** $7y^5 \div 2y^3$ **4.** $y^4 \div y^{-3}$ **5.** $(3x)^2$

6. $(3x^3)^{-2}$ **7.** $5y^4 \div 20y^2$ **8.** $(3x)^3 \times x$ **9.** $4x^3y \times 3xy^2$ **10.** $\frac{5x^2 \times 4x^3}{2x^4}$

C. Substitution:

Given that x = -3, y = ½ and $z = 5$, find the values of the following:-

1. $2x - z$ **2.** $(x + z)^2$ **3.** $2z - 3x$ **4.** $\frac{z+x}{y}$ **5.** $2x^2 + 3z$

D. Multiplying out simple brackets:

Expand each of the following:-

1. $7(x + 3)$ **2.** $5(x - 5)$ **3.** $5(7x - 1)$ **4.** $-(5x - 7)$

5. $-2x(7x + 8)$ **6.** $x^2(3x - 2)$ **7.** $a(x - 8)$ **8.** $(3 + x)x$

E. Multiplying out more complex brackets:

Expand and simplify each of the following:-

1. $(5x + 2)(3x + 1)$ **2.** $(2x + 3)(8x - 3)$ **3.** $(4x - 1)(3x - 5)$

4. $4(x + 1)(x - 1)$ **5.** $(5x - 1)^2$ **think!**   **6.** $(x + 2)(x - 2)$

F. Simple factorisation:

Factorise the following expressions:-

1. $3b + 9c$ **2.** $18m - 6n$ **3.** $4x - 8y + 2z$

4. $\frac{2}{3}p - \frac{1}{3}q$ **5.** $3xy - 12yz$ **6.** $4x^2 + 2xy$

7. $4ab - 9b^2$ **8.** $8abc + 12ab^2$

G. Factorising quadratics:

Factorise the following quadratic expressions:-

1. $5x^2 + 25x$ **2.** $x^2 - 3x$ **3.** $x^2 + 7x + 12$ **4.** $x^2 - 3x - 10$

5. $x^2 + 6x - 7$ **6.** $x^2 - 8x + 15$ **7.** $x^2 - 11x + 10$ **8.** $x^2 - 16$

9. $x^2 - y^2$ **10.** $2x^2 + 5x + 2$ **11.** $3x^2 + x - 2$ **12.** $5x^2 - 11x + 2$

H. Solving Linear Equations:

Solve the following equations

1. $3(x + 4) + 2(x - 1) = 20$ **2.** $4(2 - x) - 3(2x + 1) = 0$

3. $7(4x - 3) - (3 - x) = -82$ **4.** $\frac{2x-5}{3} = 5$ **5.** $\frac{x+5}{3} = \frac{1-x}{2}$

I. Simultaneous Linear Equations:

Solve the following simultaneous equations. Do not use trial and error!

1. $\begin{array}{l} x + 3y = 7 \\ 3x - y = 1 \end{array}$ **2.** $\begin{array}{l} 5x - 3y = 5 \\ x - 2y = 8 \end{array}$ **3.** $\begin{array}{l} 5x + 3y = 1 \\ 3x - 2y = 12 \end{array}$ **4.** $\begin{array}{l} 2x + 3y = -12 \\ 4y - 3x = 1 \end{array}$

J. Solving Quadratic Equations by Factorisation:

Solve the following equations by using factorisation

1. $x^2 - 3x - 10 = 0$ **2.** $x^2 - 8x + 15 = 0$ **3.** $2x^2 - 5x + 2 = 0$
4. $x^2 - 16 = 0$ **5.** $x^2 - 3x = 0$

K. Solving Quadratic Equations by using the Formula:

Solve the following equations by using the formula. Give your answer to 2dp.

1. $x^2 - 5x + 2 = 0$ **2.** $x^2 - 4x - 2 = 0$ **3.** $2x^2 + 3x - 4 = 0$

L. Rearranging Formulae:

For each of the following formulae, make the letter in brackets the subject:

1. $v = u + at$ (u)   **2.** $v = u + at$ (a)   **3.** $A = \frac{1}{2}h(a + b)$ (h)

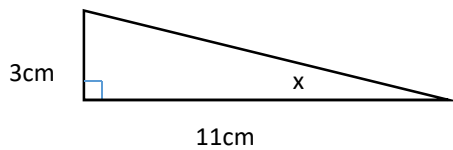**4.** $A = \frac{1}{2}h(a + b)$ (a)   **5.** $u = a + (n - 1)d$ (n)

M. Surds:

Simplify the following leaving surds in your answer where necessary. Don't use a calculator:

1. $\sqrt{27}$ **2.** $\sqrt{12} + \sqrt{48}$ **3.** $\left(\sqrt{7}\right)^2$ **4.** $\sqrt{3} \times 2\sqrt{3}$
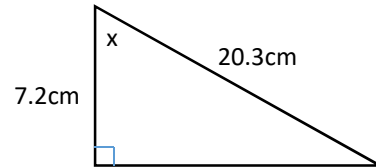
N. Trigonometry: Angles

Calculate the size of the angles x in degrees, correct to 1 d.p.
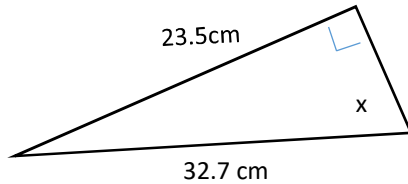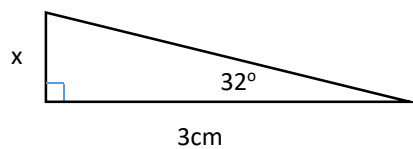
1.

3cm

11cm

x

2.

x

7.2cm

20.3cm

3.

23.5cm

x

32.7 cm

O. Trigonometry: Sides of a triangle

Calculate the length x, correct to 3 s.f.

1.

x

32°

3cm

2.

12.4cm

x

45°

3.

x

28°

52.7 cm
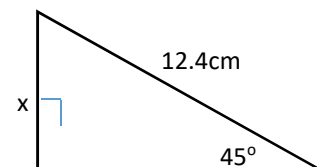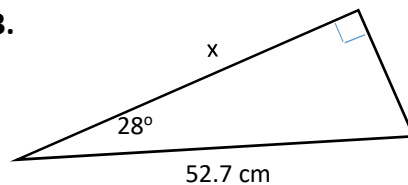
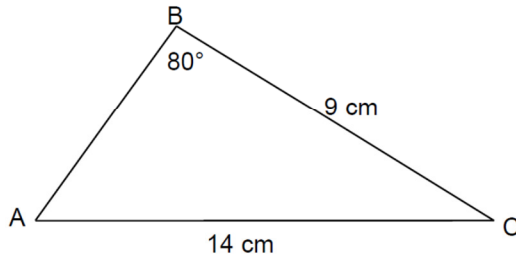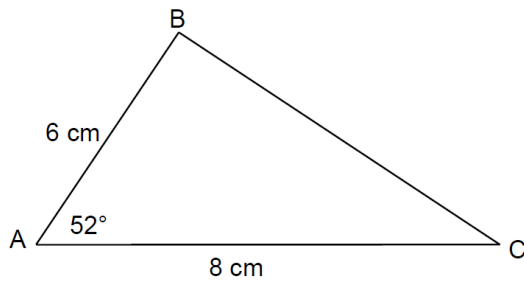## P. Trigonometry: Sine and Cosine Rules – 2 marks each
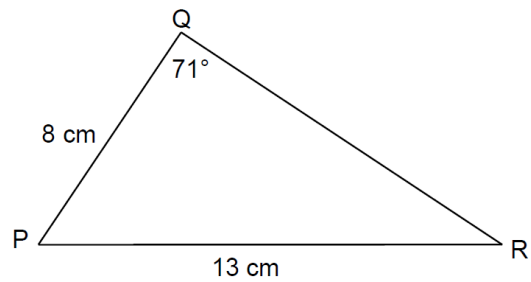
1. Use the sine rule to find the value of angle A.

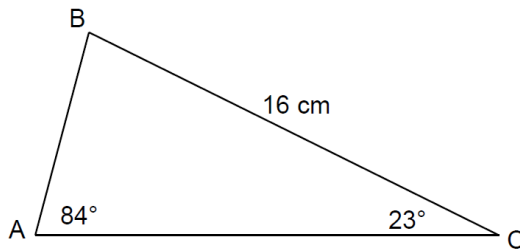

2. Calculate the area of the triangle.
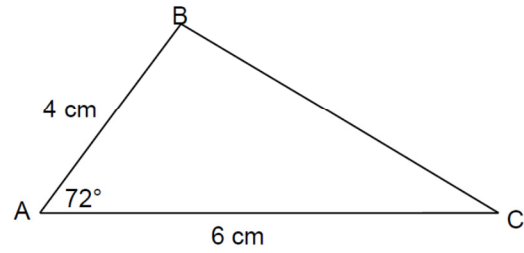
3. Use the cosine rule to find the length of BC.

4. Find the size of angle R

5. Calculate the length of AB.

6. Calculate the length of BC.