

$\alpha$	<b><math>\beta</math></b>	$\gamma$	$\delta$	$\varepsilon$	$\zeta$	$\eta$	$\theta$	$\iota$	$\kappa$	$\lambda$	$\mu$	$\nu$	$\xi$	$\omicron$	$\pi$	$\rho$	$\sigma$	$\tau$	$\upsilon$	$\varphi$	$\chi$	$\psi$	$\omega$
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*"No human investigation can be called real science if it cannot be demonstrated mathematically"*

Leonardo da Vinci

## AS Maths Assignment $\beta$ (beta)

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Please read the attached guidance notes for information about how to complete this assignment.  
Your first tracking test is week commencing 7<sup>th</sup> October for 1 hour in the main hall.

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**DRILL** *Drill are the very basic techniques you need to solve maths problems.*

**Section A:** Convert these to the form  $\alpha x^n$ :

(1)  $\frac{1}{4x}$

(2)  $\frac{3}{x^3}$

(3)  $\sqrt[4]{16x^3}$

(4)  $3\sqrt{x^3}$

**Section B:** Expand and simplify:

(1)  $(x+1)(x+2)(x+3)$

(2)  $(x+2)(x+1)^2$

**Section C:** Solve each of the following equations for  $x$ :

(1)  $\frac{2x+3}{5} = \frac{4+3x}{3}$

(2)  $\frac{3}{x+1} = \frac{4}{x}$

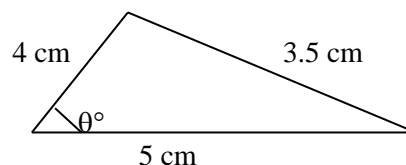
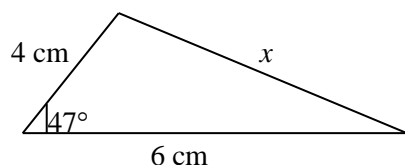
## MECHANICS

1 Statics *Draw a labelled mathematical diagram to model each the following situation's, and write out the force equation's.*

- (i) A box of mass 75 g resting on a table which is sloping at an angle  $\theta$  to the horizontal
- (ii) A stubborn dog, refusing to be dragged along by its lead (which is at an angle  $x$  to the horizontal)
- (iii) The head of a mop being pushed across the floor by its handle (which is at angle  $x$  to the horizontal)
- (iv) A wet jumper hanging by a smooth hanger on a washing line of length 2 metres. The ends of the line are attached 1.5 m apart at the same height

# PURE MATHS

- 2 Use the cosine rule to calculate the unknown length & the unknown angle, giving your answers to 3sf (*the cosine rule is written at the bottom of this assignment*)



- 3 For each of the following quadratics, solve the equation 'discriminant = 0'. By solving this equation you will find the values of  $k$  for which these quadratics have a repeated root.

(a)  $2x^2 - kx + 1 = 0$

(b)  $kx^2 + 8x + k = 0$

- 4 Solve these quadratic equations using the quadratic formula. Leave your answers in the form  $A \pm B\sqrt{C}$  :

(a)  $3x^2 + 9x + \frac{1}{2} = 0$

(b)  $4x^2 - 2x - 3 = 0$

- 5 Solve the following equations using the method of completing the square. Leave your answers in the form  $A \pm B\sqrt{C}$  .

(a)  $3x^2 + 6x = 0$

(b)  $x^2 - 2x - 8 = 0$

- 6 Write  $4\sqrt{2}$  in the form  $2^y$  showing every step of your working.

- 7 Rationalise the denominator of  $\frac{6}{1-\sqrt{3}}$  leaving your answer in the form  $a + b\sqrt{3}$

- 8 Where does the graph of  $y = \frac{x-2}{2}$  cross the coordinate axes?

- 9 Construct the equation of the circle with centre  $(-1, 2)$  and diameter  $\sqrt{52}$

- 10 Showing all your steps, make  $x$  the subject of these formulae:

(a)  $y = \frac{x}{3} + 4$

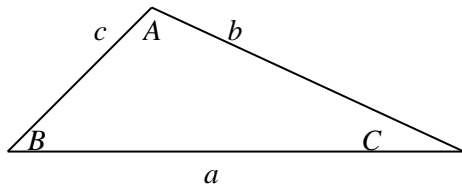
(b)  $t = \frac{x+2}{3}$

- 11 Where does the line  $y = x + 1$  cross the curve  $x^2 - 2y + 3 = 0$ ? (*see assignment alpha question 11 for the method*)

12. a) What is the equation of the line through the point  $(2, -2)$  with gradient 3?  
b) What is the equation of the line through the points  $(1, 4)$  and  $(-3, 2)$ ?

**Note:** It may help you to look back at the bullet points at the bottom of assignment alpha when completing this assignment.

**The cosine rule.** If you have a problem involving all 3 sides of a triangle and one angle you can use the cosine rule to find the missing value (either the angle or one of the sides)



The cosine rule

$$2bc \cos A = b^2 + c^2 - a^2$$

**Answers**

**A:** (1)  $\frac{1}{4}x^{-1}$  (2)  $3x^{-3}$  (3)  $2x^{\frac{3}{4}}$  (4)  $3x^{\frac{3}{2}}$

**B:** (1)  $x^3 + 6x^2 + 11x + 6$  (2)  $x^3 + 4x^2 + 5x + 2$  **C:** (1)  $x = -\frac{11}{9}$  (2)  $x = -4$

(1)

(2)  $x = 4.39$  cm,  $\theta = 44.0^\circ$

(3a)  $k = \pm 2\sqrt{2}$

(3b)  $k = \pm 4$

(4a)  $-\frac{3}{2} \pm \frac{5}{6}\sqrt{3}$

(4b)  $\frac{1}{4} \pm \frac{1}{4}\sqrt{13}$

(5a) 0, -2

(5b) 4, -2

(6)  $2^{\frac{5}{2}}$

(7)  $-3 - 3\sqrt{3}$

(8) (0, -1) (2, 0)

(9)  $(x+1)^2 + (y-2)^2 = 13$

(10a)  $x = 3y - 12$

(10b)  $x = 3t - 2$

(11) (1, 2)

(12)(a)  $3x - y - 8 = 0$  (b)  $x - 2y + 7 = 0$



**ASSIGNMENT** .....

**COVER SHEET**

Name \_\_\_\_\_ Current Maths Teacher .....

Please tick honestly:

	Yes	No - explain why.
Have you ticked/crossed your answers using the answers given?		
Have you corrected all the questions which were wrong?		

How did you find this assignment?

Use this space to outline any problems you've had and how you overcame them as well as the things which went well or which you enjoyed/learned from.