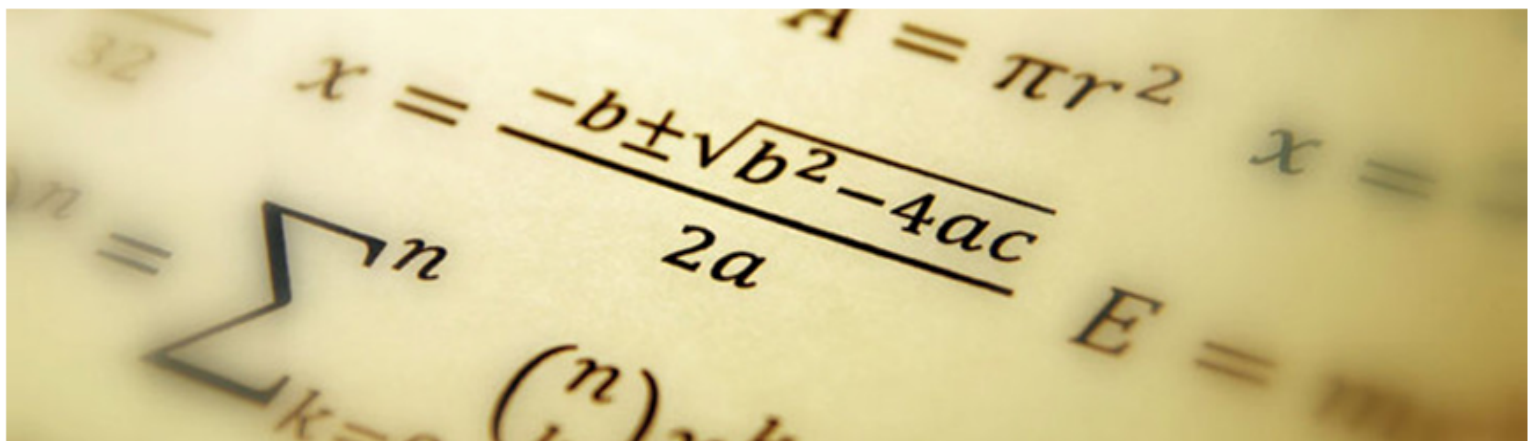


THE
DUSTON TDS 4-19
SCHOOL

Knowledge Organiser *Maths*

Year 11 Term 4 High



Year 11 High Term 4 Overview

Data and Statistics

Stem and leaf & Scatter graphs	Cumulative frequency and box plots	Pie charts & Sampling	Probability & relative frequency	Sample space diagrams
Averages from tables & Frequency polygons	Histograms	Time Series	Probability trees	Set theory (with Venn diagrams)

Ratio, proportion, fractions, decimals and percentages

Simplify/scale up/divide ratio	Recipes and best value	Exchange rates	Calculating with fractions	Percentages of amounts, Increasing and decreasing
Tricky ratio problems	Tricky ratio problems	Direct & inverse proportion	Exponential & other non-linear graphs	Compound interest & Reverse percentages

Useful Websites—Resources, Past Papers, Video Tutorials and Solutions

- ◆ <https://corbettmaths.com/contents/>
- ◆ <https://vle.mathswatch.co.uk/vle/>
USERNAME: namesurname@dustonschool
PASSWORD: berrywood
- ◆ <https://www.methodmaths.com/>
CENTRE ID: duston
USERNAME: firstnamesurname PASSWORD: berrywood

1. G is inversely proportional to H.

When $G = 45$, $H = 5$.

Find the value of G when $H = 14$.

2. The functions f and g are such that:

$f(x) = -3x + 12$ and $g(x) = ax + b$ where a and b are constants.

$g(5) = 38$ and $f^{-1}(-174) = g(8)$.

Find the value of a and b .

3. The line L is a tangent to the circle $x^2 + y^2 = 45$ at the point $(6, -3)$.

Line L crosses the x -axis at the point P .

Work out the coordinates of P .

4. The table belows shows some values of x and y that satisfy the equation $y = a \cos x^\circ + b$.

x	0	30	60	90	120	150	180
y	0	$-4 + 2\sqrt{3}$	-2	-4	-6	$-4 - 2\sqrt{3}$	-8

Find the value of a and b .

5. Prove the square of any odd number must be an odd number.

6. X is directly proportional to the square of Y.

When $X = 50000$, $Y = 10$.

Find the value of X when $Y = 19$.

7. The functions f and g are such that $f(x) = 7x - 9$ and $g(x) = -x + 5$.

a) Find $f(10)$.

b) Find $g(-11.5)$.

c) Solve $f(x) = g(x)$.

8. Robinder buys a computer for £180.

He wants to put a tag with a price on the computer so that in the sale he can give a discount of 25% off the price on the tag and still make a profit of 30% on the price he paid for the computer.

Work out the price that Robinder should put on the tag.

Term 4—Homework 2—Higher Questions Due.....

- 1.** The number of bees in a garden decreases by $x\%$ each year.

Given that the number of bees halves in 12 years, work out the value of x .

Give your answer correct to 2 decimal places.

- 2.** Ferial buys a computer for £220.

She wants to put a tag with a price on the computer so that in the sale she can give a discount of 20% off the price on the tag and still make a profit of 40% on the price she paid for the computer.

Work out the price that Ferial should put on the tag.

- 3.** The function f is such that $f(x)=4x+9$.

a) Find $f^{-1}(x)$.

b) Solve $f(x) = f^{-1}(x)$.

- 4.** The points T , U , V and W lie in order on a straight line.

$$TU : UW = 5 : 4$$

$$TV : VW = 16 : 2$$

Work out $TU : UV : VW$.

- 5.** David has 26 cards.

Each card has a different symbol on it.

David gives one card to Amanda and one card to Nicola.

In how many ways can David do this?

- 6.** A fisherman wants to estimate the number of fish in his pond.

One day he catches 180 fish. He puts a tag on each fish then releases them.

Then next day the fisherman catches 115 fish.

30 of these fish have a tag on them.

Work out an estimate for the total number of fish in his pond.

Write down any assumptions you have made.

- 7.** The number of bees in a garden t days from now is b_t where:

$$b_0 = 80 \text{ and } b_{t+1} = 1.06b_t.$$

Work out the number of bees in the garden 5 days from now.

- 8.** Donatella buys a mobile phone for £160.

She wants to put a tag with a price on the mobile phone so that in the sale she can give a discount of 35% off the price on the tag and still make a profit of 30% on the price she paid for the mobile phone.

Work out the price that Donatella should put on the tag.

Term 4—Homework 3—Higher Questions Due.....

- 1.** Work out the largest integer value of c that satisfies the inequality:

$$10c-5 < 4c-2$$

- 2.** The product of two consecutive positive integers is added to the larger of the two integers.
Prove the result is always a square number.

- 3.** x and y are two positive integers greater than 2.

The highest common factor (HCF) of x and y is 2.

The lowest common multiple (LCM) of x and y is 40.

Find the value of x and y .

- 4.** The first 5 terms of a quadratic sequence are: -15,-16,-13,-6,5.

Find an expression, in terms of n , for the n th term of this quadratic sequence.

- 5.** The number of butterflies in a garden t days from now is b_t where:

$$b_0 = 70 \text{ and } b_{t+1} = 1.12b_t.$$

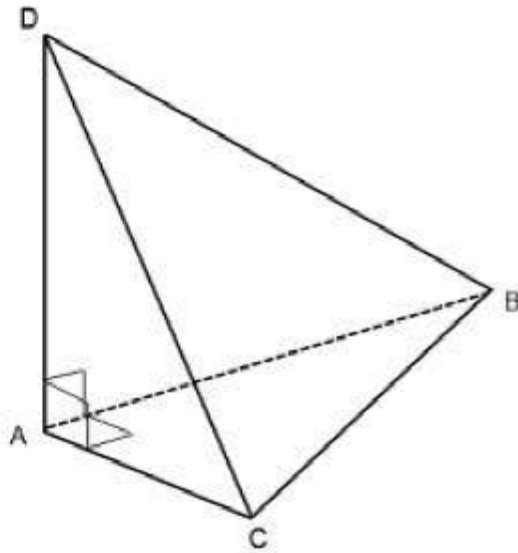
Work out the number of butterflies in the garden 5 days from now.

6. Wisal buys a television for £195.

She wants to put a tag with a price on the television so that in the sale she can give a discount of 25% off the price on the tag and still make a profit of 5% on the price she paid for the television.

Work out the price that Wisal should put on the tag.

7. The diagram shows a tetrahedron.



AD is perpendicular to both AB and AC.

AB = 3 mm, AC = 6 mm and AD = 5 mm.

Angle BAC = 90° .

Calculate the size of angle BDC.

Give your answer correct to 1 decimal place.

8. Solve the inequality $h^2 + 4h \leq 60$.