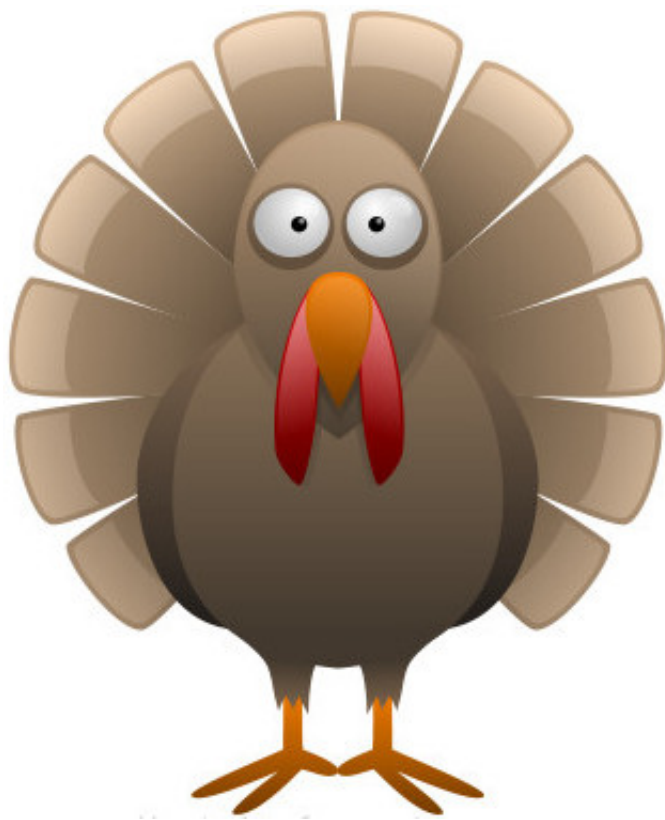


Grade Gobbler REVISION 2021



**Additional
Mathematics**

Additional Mathematics

Grade Gobbler 1

40 Mark Paper

Question 1

Determine the value of $\int_2^3 x^3 + 7 \, dx$

[4 marks]

Question 2

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

(i) State the value of $f(2)$

[1 mark]

(ii) Use the fact that $\frac{1}{x^2} = x^{-2}$ to help in finding the derivative of $f(x)$

[2 marks]

(iii) Find the value of $f'(2)$

[1 mark]

Question 3

- (i) Use Pascal's triangle to expand the brackets;

$$(2 + 3x)^4$$

Give each term in your expansion in as simple a form as possible.

The following may be of help in setting out your working....

$$\begin{aligned}(2 + 3x)^4 &= \left(\quad \right) \times \left(\quad \right) \times \left(\quad \right) \\ &+ \left(\quad \right) \times \left(\quad \right) \times \left(\quad \right) \\ &+ \left(\quad \right) \times \left(\quad \right) \times \left(\quad \right) \\ &+ \left(\quad \right) \times \left(\quad \right) \times \left(\quad \right) \\ &+ \left(\quad \right) \times \left(\quad \right) \times \left(\quad \right)\end{aligned}$$

[4 marks]

- (ii) By using your part (i) answer, or otherwise, expand the brackets of;

$$(2 + 3\sqrt{x})^4$$

[2 marks]

Question 4

- (i) Use the factor theorem to prove that $(x - 3)$ is a factor of

$$f(x) = x^3 + 7x^2 - 6x - 72$$

[2 marks]

- (ii) Hence, or otherwise, factorise completely the cubic polynomial.

[3 marks]

Question 5

A particle moves in a straight line with constant acceleration.

Initially its velocity is 2 m s^{-1} and after 5 seconds its velocity is 19 m s^{-1}

Find the acceleration.

[4 marks]

Question 6

By first expanding the brackets, determine the integral of;

$$y = \sqrt{x} + 4(x + 2)(x - 3)$$

[5 marks]

Question 7

$$f(x) = x^3 - 3x + 1$$

- (i) Find all turning points of this function by solving the equation,

$$f'(x) = 0$$

[5 marks]

- (ii) For each turning point clearly state, with justification, if it is a local minimum or a local maximum.

[3 marks]

Question 8

Provide proof that determines if a Δ with the following sides is right angled, or not,

$$(m^2 - n^2) \qquad 2mn \qquad (m^2 + n^2)$$

where m and n are positive integers with $m > n$.

[4 marks]

This document is a part of a **Mathematics Community Outreach Project** initiated by Shrewsbury School

It may be freely duplicated and distributed, unaltered, for non-profit educational use

In October 2020, Shrewsbury School was voted “**Independent School of the Year 2020**”

© 2021 Number Wonder

Teachers may obtain detailed worked solutions to the exercises by email from mhh@shrewsbury.org.uk