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0607/51

May/June 2018

1 hour

Additional Materials: Graphics Calculator

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

The total number of marks for this paper is 24.

This document consists of 7 printed pages and 1 blank page.

Answer **all** the questions.

INVESTIGATION

LARGEST PRODUCTS

This investigation looks at finding the largest product when two or more positive integers have a given sum.

For the positive integers 2 and 5

- the sum $2 + 5$ is 7
- the product 2×5 is 10.

- 1 (a) Complete this table for all the **different** pairs of positive integers that have a sum of 8.

Integers		Sum	Product
1		8	
2		8	
3		8	
4	4	8	16

Write down the calculation that gives the largest product.

.....

- (b) Complete this table for all the **different** pairs of positive integers that have a sum of 10.
Note that 3 and 7 is the same pair as 7 and 3.

Integers		Sum	Product
		10	
		10	
3	7	10	21
		10	
		10	

Write down the calculation that gives the largest product.

.....

- (c) Find the largest product of two positive integers that have a sum of 6.

.....

- (d) Use your answers to **part (a)**, **part (b)** and **part (c)** to help you complete the table.

Sum	6	8	10	12	14
Largest product					49

- (e) (i) The sum of two positive integers is S .
 S is an even number.

Find an expression, in terms of S , for the largest product of the two integers.

.....

- (ii) The sum of two positive integers is 62.

Find the largest product of the two integers.

.....

- (f) The sum of two positive integers is S .
 S is an even number.
 The largest product of the two integers is 576.

Find the value of S .

.....

- 2 (a) Complete this table for all the **different** pairs of positive integers that have a sum of 9. Note that 2 and 7 is the same pair as 7 and 2.

Integers		Sum	Product
		9	
		9	
		9	
		9	

Write down the calculation that gives the largest product.

.....

- (b) Find the largest product of two positive integers that have a sum of 7.

.....

- (c) Use your answers to **part (a)** and **part (b)** to help you complete the table.

Sum	7	9	11	13	101
Largest product			30		

- (d) The sum of two positive integers is S .
 S is an odd number.

- (i) Explain why the largest product of the two integers is always even.

.....

- (ii) Find an expression, in terms of S , for the largest product of the two integers.
 Do not simplify your answer.

.....

- 3 (a) **Three** positive integers have a sum of 6.

Complete the table for all the different sets of positive integers that have a sum of 6.
Writing the positive integers in a different order does not give a different set.

Integers			Sum	Product
			6	
			6	
			6	

Write down the calculation that gives the largest product.

.....

- (b) Look at how you found the largest product in **part (a)** and in **question 1(a)**.

Four positive integers have a sum of 40.

Show that the largest product of these four integers is 10 000.

(c) Complete the table.

Sum	6	40	15	24
Number of positive integers in the sum	3	4	5	6
Largest product		10 000		

(d) n integers have a sum of 40, where n is a factor of 40.

Find the value of the largest product of the n integers.

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