SEKOLAH BUKIT SION
Middle School Term 4 Examination

STUDENT NAME

EXAM NUMBER

GRADE

MATHEMATICS

Paper 2 Structured Questions

Grade 7

23 May 2018

90 minutes

Students answer on the Question Paper.

Additional Materials: Calculator, Ruler, Protractor

READ THESE INSTRUCTIONS FIRST

Write your name, exam number and grade on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of 10 printed pages.

1. (a) Express 1500 as the product of its prime factors.

Answer: ………………………………… [1]

(b) Given that $1500x$ is a square, write down the smallest possible value of x.

Answer: ………………………………… [1]

(c) Find the HCF of 1500 and $2 \times 3^2 \times 5^2 \times 7$, leaving your answer in index form.

Answer: ………………………………… [1]

2. Arrange the following numbers in ascending order.

$$-0.37, \quad -0.373, \quad -0.3\overline{7}, \quad -\frac{16}{42}, \quad -0.\overline{373}$$

Answer: ………………………………………………………………………… [2]

3. Use a calculator to evaluate

(a) $\dfrac{(5\frac{1}{2})^2 + 2\frac{1}{3}}{(-1-\frac{1}{4})^3}$, giving your answer correct to 2 decimal places,

Answer: ………………………………… [1]

(b) $\sqrt[3]{12.3 - 4\pi + 0.29}$, giving your answer correct to 4 significant figures.

Answer: ………………………………… [1]

4. There were some cookies on a plate. Tom took 1/3 of the cookies and returned 6 cookies.
   Alan took 1/5 of the remaining cookies and returned 2 cookies.
   Ellen took ½ of the remaining cookies and returned 1 cookie.
   There were 14 cookies **left** on the plate in the end.

   How many cookies were there on the plate at first?

   Answer: ………………………………… [3]

5.
   (a) The diagrams of the first 4 terms of a pattern are shown below.

   Diagram 1

x	y
x	y

   Diagram 2

x	y	x
x	y	x
x	y	x

   Diagram 3

x	y	x	y
x	y	x	y
x	y	x	y
x	y	x	y

   Diagram 4

x	y	x	y	x
x	y	x	y	x
x	y	x	y	x
x	y	x	y	x
x	y	x	y	x

   (b) The algebraic expressions of the first 2 terms of the pattern above are also shown below.

Diagram 1	*Diagram 2*	*Diagram 3*	*Diagram 4*
$2(x + y)$	$3(2x + y)$	…………………..	…………………

   Write the algebraic expression for Diagram 5.

   Answer: ………………………………… [3]

6. During an election for class president, of the 40 students who can vote, only 7 out 8 voted.

There were three candidates whose votes are in the ratio of 4 : 2 : 1.

(a) How many students did not vote?

Answer: ……………………………… [1]

(b) How many students voted for the candidate with the most votes?

Answer: ……………………………… [1]

7. A building is planned to be constructed. But before it can be built, a model of the building has be created first. The ratio of the building's plan to its model to its actual measures is 1 : 5 : 120.

(a) A rectangular section of the building has dimensions of 2.5 cm by 3.75 cm on the drawing. Calculate the dimensions of this section on the model.

Answer: ……………………………… [1]

(b) The building's **actual** executive meeting room is planned to have dimensions 12 m by 15 m. Calculate the dimensions of the executive meeting room on the model.

Answer: ……………………………… [2]

8. On a holiday, Bart went to two souvenir shops to buy some shirts for his friends.

   He paid a total of $(2x -3) for 3 large-sized shirts in the first shop.
   He paid another $(3x) for 5 medium-sized shirts in the second shop.

   If the difference of **1 large-sized shirt** and **1 medium-sized shirt** is $2:

   (a) Formulate an equation in terms of *x* and solve for *x*.

Answer: ……………………………… [2]

   (b) Calculate how much did he pay for all the souvenir shirts.

Answer: ……………………………… [1]

9. Mr Li owns a small workshop and employs 24 workers and 2 supervisors.
   Each worker receives $324 for working 45 hours per week while each supervisor is paid $410 per week.

   (a) Calculate **how much in total** the weekly salary that Mr Li gives to all his employees.

   Answer: ……………………………… [1]

   (b) As a result of installing new machinery, Mr Li thinks that it is possible to run the workshop with only one supervisor and the number of workers must be reduced by a quarter.

   The supervisor will be given a raise of 15% in his weekly salary.
   The workers will then work for 40 hours only but will receive an increase of $1.20 per hour in their weekly salary.

   Find how much total money did the weekly salary **reduce** after Mr Li installed the new machinery.

   Answer: ……………………………… [4]

10. Mrs. Lee wishes to buy a new car which costs $120 000.
There are two different car loans she can opt for.

In Plan *A*, she has to pay a down payment of $50 000 and a monthly instalment of $1250 for 6 years.

In Plan *B*, she has to pay a lump sum which is 60% of the price of the car and take up a car loan for the remaining 40% over a period of 5 years at 4% simple interest per annum.

(a) Calculate the Hire Purchase Price of the car using Plan *A*.

Answer: ……………………………… [2]

(b) Calculate the monthly instalment of the car using Plan *B*.

Answer: ……………………………… [2]

(c) Which Plan is cheaper and by how much cheaper is it?

Answer: ……………………………… [1]

11.

(a) Plot the points (–2, 3), (–2, –7), and (4, –5) on a Cartesian Plane using 2 cm to represent 1 unit on *x*-axis and 2 cm to represent 2 units on *y*-axis.

Connect the points to form a triangle. [1]

(i) Name the type of this triangle according to its sides.

Answer: .... [1]

(ii) Write down the measure of the largest of the three angles.

Answer: .... [1]

(iii) Write down the area of the triangle.
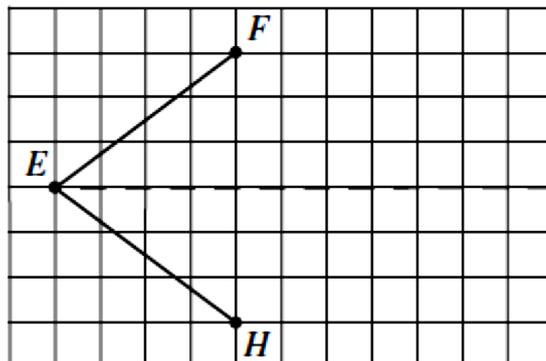
Answer: .... [1]

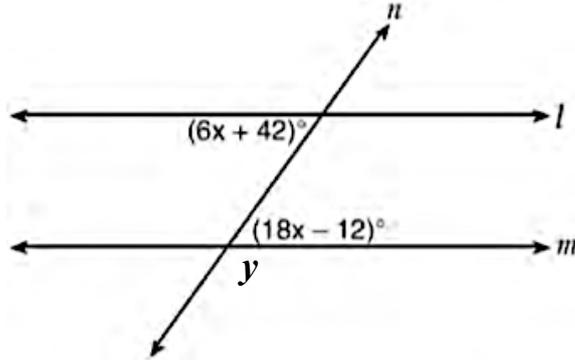(b) Complete quadrilateral *ABCD* so that the dotted line is the only line of symmetry.

[1]
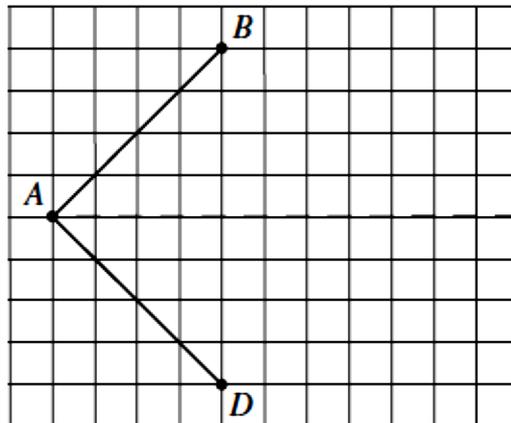
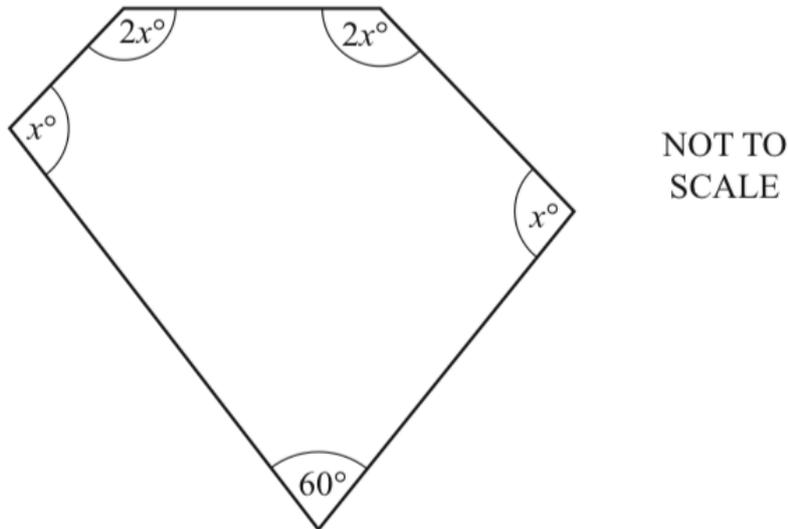(c) (i) Complete quadrilateral *EFGH* so that the dotted line is one of two lines of symmetry. [1]

12.

(a) Line *n* intersects line *l* and *m*, forming angles shown in the diagram below.
Calculate the measure of the angle marked with *y*.

Answer: …………………………………… [3]

(b) The diagram below shows a pentagon. Find the value of *x*.

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Answer: …………………………………… [2]

(c) Two angles of a triangle are 42° and 73°.
Calculate the supplement of the 3rd angle.

Answer: …………………………………… [1]

13. The table below shows the speed v (m/s) of an object in time t (seconds) in the first 20 seconds of its journey.

Time t (seconds)	0	2	5	20	25	30
Speed v (m/s)	a	10	16	46	b	66

(a) Plot the values given the table on a Cartesian Plane and create **a straight line graph** of the object's journey where the: [3]

        x-axis represents **time** using 5 seconds for every 2 cm

        y-axis represents **speed** of the object using 5 m/s for every 2 cm.

        Note: Consider the speed of up to 80 m/s and time up to 30 minutes.

(b) Using your graph,

    (i) find the values of a and b.

Answer: a = ………………………… [1]

b = ………………………… [1]

    (ii) find the time that the object has a speed of 30 m/s.

Answer: ……………………………… [1]

(c) Formulate equation of the straight-line graph of the object's journey in part (a).

Answer: ……………………………… [1]