YISHUN SECONDARY SCHOOL

We Seek, We Strive, We Soar

MID-YEAR EXAMINATION

Name : _____ Reg. No : _____ Class: _____

Calculator Model:_____

SEC1EXPRESS   **DATE: 12MAY 2014**

MATHEMATICS

MAX MARKS: 80   -   **DURATION: 2 HOURS**

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class in the spaces provided at the top of this page.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

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.
The total of the marks for this paper is 80.

This document consists of **16** printed pages including the cover page

Answer **all** the questions.

1.   Calculate

(a) $\dfrac{\left(5\frac{1}{2}\right)^2}{\left(1-\frac{1}{3}\right)^3}$, giving your answer correct to the nearest integer.

Answer(a) .... [1]

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

Answer(b) .... [1]

2.   Given that $p = 2$ and $q = -3$, fill in the blanks with '<', '=' or '>'.

(a) $2q \div 3 + 2$ _____ 3

Answer(a) .... [1]

(b) $5q^2 - 36p$ _____ -29

Answer(b) .... [1]

3. If you add 7 to a certain integer, the result is a positive number, but if you add 5 to it, the result is a negative number. Find this integer.
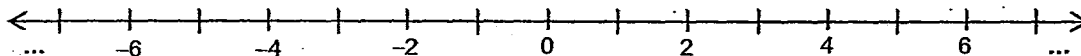
Answer .... [1]

4. By rounding each number to 1 significant figure, **estimate** the value of $\dfrac{8.4 \times \sqrt[3]{998}}{0.432 \times 31.99}$.

Show your working.

Answer .... [2]

5. Arrange the following numbers in ascending order.

$$-4.7, \frac{19}{4}, -4.\dot{7}, \sqrt{22}$$

Answer .... [2]

6. **(a)** Express 5.973 correct to 1 decimal place.

Answer(a).............................. [1]

(b) Express 364.51 correct to 2 significant figures.

Answer(b).............................. [1]

(c) Use your answers in parts (a) and (b) to estimate the value of $364.51 \div 5.973$.

Answer(c) .... [1]

7. Consider the following eight numbers:

$$\sqrt{36}, 81, 17, \sqrt{169}, \quad 5^2, \quad \pi, \sqrt{7}, \frac{22}{7}$$

Write down

(a) the square number(s),

Answer(a) .... [1]

(b) the prime number(s),

Answer(b) .... [1]

(c) the irrational number(s).

Answer(c) .... [1]

8. Written as a product of its prime factors,

p is $2^6 \times 3^3$,

q is $2^3 \times 3 \times 5^2$,

r is $2^2 \times 3^2 \times 7$.

Find

(a) the cube root of p, giving your answer in index notation,

Answer(a) .... [1]

(b) the lowest common multiple of p, q and r, giving your answer in index notation,

Answer(b) .... [1]

(c) the greatest number that will divide p, q and r exactly.

Answer(c) .... [1]

9. Factorise each of the following completely:

(a) $15y - 12y^2$,

Answer(a) .... [1]

(b) $a(4b - 5c) + (5c - 4b)$.

Answer(b) .... [2]

10. Last month, Nicole spent $\frac{4}{9}$ of her monthly salary on food, $\frac{1}{5}$ of her monthly salary on transportation and saved the rest.

    (i) What fraction of her salary did she save?

Answer(i) .... [1]

    (ii) Nicole spent a further $\frac{2}{3}$ of her savings on a present for her mother.

    What fraction of her salary did she have left?

Answer(ii) .... [2]

11. Solve the following equations:

    (a) $3a + 2 = 4a - 10$,

Answer(a) .... [1]

    (b) $\frac{8}{2y - 1} = 7$.

Answer(b) .... [2]

12.   Three traffic lights along a street turn red at regular intervals of 1 minute, 1 minute 10 seconds and 3 minutes 30 seconds respectively. If all the traffic lights turned red at the same time at 0830, find the next time this will occur again.

Answer .... [3]

13.   The diagram below shows a rectangle with its length and breadth as indicated. Find the value of p and q.

$(3q-3)\,cm$

$(\frac{1}{2}p+2)\,cm$

6 cm

$(2p-1)\,cm$
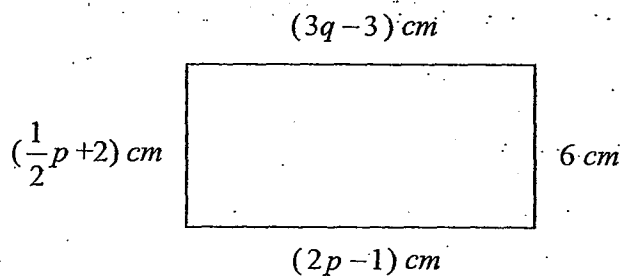
Answer $p =$ ....

$q =$ .... [3]

14. An interior angle of a regular polygon is four times its exterior angle.

Find the number of sides of the polygon.

Answer ....sides [3]

15. Jess travelled from CityA to CityB using different modes of transport. She covered $\frac{5}{9}$ of her journey by train, 0.75 of the remainder by bus and the rest of the journey on foot.

(a) Find the fraction of the journey that she travelled on foot.

Answer(a)............................... [2]

(b) If she travelled 35 km more by train as compared to the journey by bus, how far apart are the 2 cities?

Answer(b) ....km [2]

16. In the diagram below, the straight line *PQR* is parallel to *ST* and

QS is parallel to *RU*. $PS = QS$, $\angle SQR = 116°$ and $\angle UTS = 39°$.
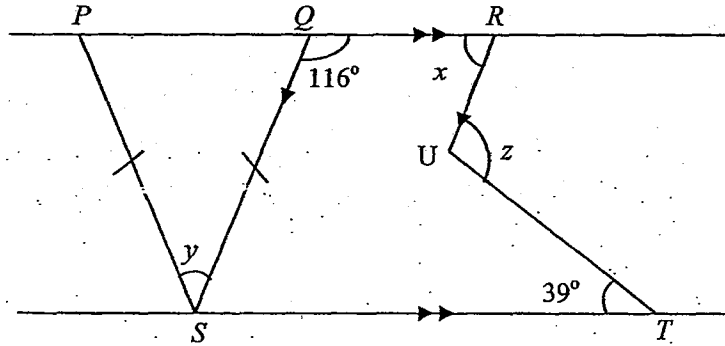
State **all** geometrical reasons clearly.

Calculate

(a) $\angle x$,

Answer(a) ....° [1]

(b) $\angle y$,

Answer(b) ....° [1]

(c) $\angle z$.

Answer(c) ....° [2]

17. Simplify the following expressions:

(a) $1 + \dfrac{a+1}{2} + \dfrac{3}{2}$,

Answer(a) .... [2]

(b) $\dfrac{2x-5y}{7} - \dfrac{x-6y}{2}$.

Answer(b) .... [2]

18. "A prime number is a whole number greater than 1, with exactly 2 factors, 1 and itself."

Given that p and q are prime numbers, determine if each statement is true or false. Explain your answer.

(a) $5p$ is a prime number.

Answer(a) ....

....[2]

(b) $q + q + q + q$ is a composite number.

Answer(b) ....

.... [2]

19. Simplify the following expressions:

(a) $-5a + 8b + 2a - b$,

Answer(a) .... [1]

(b) $6(2m - n) + 2n - m$,

Answer(b) .... [2]

(c) $4t - [5s - (t + s)]$.

Answer(c) .... [2]

20.   Katie bought 2 vanguard sheets each measuring 70 cm by 90 cm.

She cut out square cards of identical size from the vanguard sheets such that there was no wastage.

(i)   What is the largest possible length of the side of each square card she cut out?

Answer(i) ....cm [2]

(ii)   What is the total number of square cards she cut out such that there was no wastage?

Answer(ii) ....square cards [1]

(iii)   If Katie wants to use an equal number of square cards to write her revision notes for each of her 5 subjects.

What is the maximum number of square cards she can use for each subject?

How many square card(s) will be left over?

Answer(iii)................square cards used[1]

................square card(s) left [1]

21. The Benjamin Sheares Bridge is divided into three sections.

The first section is x m long.

The last section is 250m longer than the first section.

The middle section is twice as long as the last section.

(i) Write down an expression, in terms of x for,

(a) the length of the last section,

Answer(i)(a)........................m [1]

(b) the length of the middle section.

Answer(i)(b)........................m [1]

(ii) The Benjamin Sheares Bridge is 1.8km long.

Write down an equation, in terms of x, to represent this information, and show that it reduces to $1800 = 4x + 750$.

Answer: [1]

(iii) Solve the equation, and find the length of the first section of the bridge.

Answer(iii) ....m [2]

22.   In the answer space, construct and label a quadrilateral *PQRS* such that $\angle PQR = 85°$,

$\angle QRS = 65°$, *PQ* = 6cm and *QR* = 8.3cm.

The side *RS* is drawn in the answer space.

(a)   Using ruler, protractor and compasses only, complete the quadrilateral.   [2]

Answer:

R ――――――――――――――― S

(b)   On the same diagram, construct

(i)   the bisector of angle *QPS*,   [1]

(ii)   the perpendicular bisector of side *RS*.   [1]

(c)   These two bisectors meet at *T*.

Mark the point *T*, measure and write down the size of $\angle SPT$.

Answer(c) ....° [2]

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23. (a) Find the value of x.

[Hint: Look out for 'triangles'.]
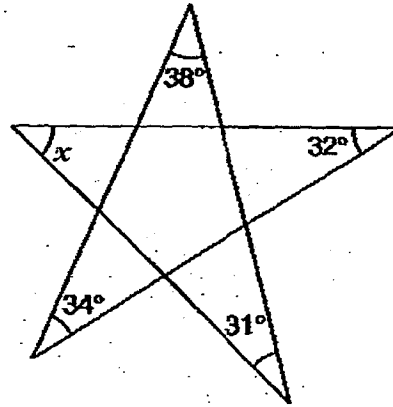
Answer(a) ....° [2]

(b) The diagram shows three regular pentagons.

Find the value of p and of q.
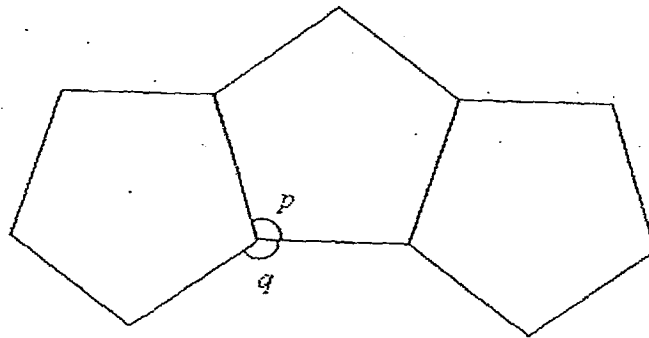
Answer(b)p = ...° [2]

q = ...° [1]

(c) In the diagram, *AB*, *DE* and *FCG* are parallel.

Given that ∠*ABC* = 84° and∠*BCD* = 39°.

Find reflex ∠*CDE*.

Answer(c) ....° [2]

End of paper
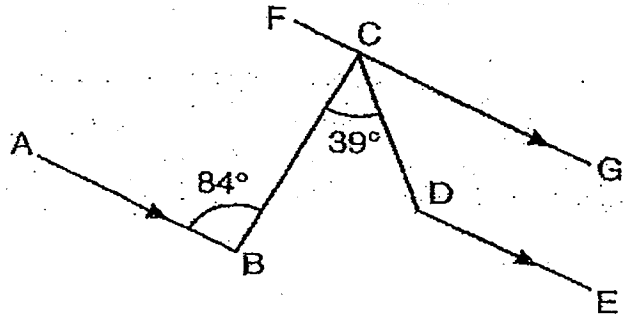
	ANSWER SCHEME		
1(a)	102	13	$p = 8$ $q = 6$
1(b)	0.287	14	$n = 10$
2(a)	<	15(a)	$\dfrac{1}{9}$
2(b)	>	15(b)	157.5 km
3	$x = -6$	16(a)	64° (int $\angle$)
4.	$6\dfrac{2}{3}$	16(b)	52° (base of iso triangle)
5	$-4\cdot7$, -47, $\sqrt{}$,	16(c)	103° (alt $\angle$)
6(a)	6.0	17(a)	$\dfrac{a+6}{2}$
6(b)	360	17(b)	$\dfrac{32y-3x}{14}$
6(c)	60	18(a)	No Using an integer to substitute into p and explain that it is not a prime number. E.g. if $p = 2$, $2p = 10$ which is not a prime number. OR It has more than 2 factors other than 1 and itself. e.g. p / 5 (any 1)
7(a)	81, 5^2	18(b)	Yes. Reasoning must be general. E.g. Since $q + q + q + q = 4q$. It has more than 2 factors other than 1 and itself. (4, 2, q , any 1 mentioned)
7(b)	17, $\sqrt{169}$	19(a)	$-3a + 7b$
7(c)	Π, $\sqrt{7}$	19(b)	$11m - 4n$
8(a)	$2^2 \times 3$	19(c)	$5t - 4s$
8(b)	$2^6 \times 3^2 \times 5^2 \times 7$	20(i)	10
8(c)	12	20(ii)	126
9(a)	$3y(5 - 4y)$	20(iii)	25 square cards used. 1 square card left.
9(b)	$(a - 1)(4b - 5c)$	21(i)(a)	$(x + 250)$
10(i)	$\dfrac{16}{45}$	21(i)(b)	$2x + 500$
10(ii)	$\dfrac{16}{135}$	21(iii)	$x = 262.5$
11(a)	$a = 12$	22(c)	47 (±1)
11(b)	$y = 1\dfrac{1}{14}$	23(a)	45°
12	0837	23(b)	$p = 108°$, $q = 144°$
		23(c)	225°