



BEATTY SECONDARY SCHOOL
END-OF-YEAREXAMINATION 2014

Teacher's
Copy

SUBJECT : Mathematics

LEVEL : Secondary 1 Express

PAPER :1

DURATION : 1 hour 15 minutes

SETTER :MrAnthony Goh

DATE :1 October 2014

CLASS :	NAME :	REG NO :
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READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on 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.

You are expected to use a scientific calculator to evaluate explicit numerical expressions.

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 .

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

The total number of marks for this paper is **50**.

For Examiner's Use
50

Answer all questions.

1 (a) Evaluate $\frac{0.301299}{\sqrt[3]{13.364+1.292}} + 0.071265$.

0.153

[B1]

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

(b) Write the following set of numbers in ascending order.

0.422, $\frac{3}{7}$, -0.422, 0.42

-0.422, 0.422, 0.42, $\frac{3}{7}$ [B1] ($\frac{3}{7} = 0.42857\dots$)

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

(c) The temperature at the bottom of a mountain is 18°C . The temperature at the top of the mountain is -26°C . Find the difference between the two temperatures.

$18 - (-26) = 44^\circ\text{C}$ [B1]

Answer (c)..... $^\circ\text{C}$ [1]

2 (a) Express 3150 as a product of its prime factors in index notation.

$3150 = 2 \times 3^2 \times 5^2 \times 7$ [B1]

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

(b) Hence, express $\sqrt{3150 \times 14}$ as a product of its prime factors

$\sqrt{3150 \times 14} = \sqrt{2 \times 3^2 \times 5^2 \times 7 \times 2 \times 7}$ [M1]

$= \sqrt{2^2 \times 3^2 \times 5^2 \times 7^2}$

$= 2 \times 3 \times 5 \times 7$ [A1]

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

- 3 A football club invested \$30 million in a famous footballer. A newspaper reported that the club would have to sell 674 998 tickets to recover their investment.

(a) Correct 674 998 to two significant figures.

670 000

[B1]

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

(b) Use your answer to (a) to estimate the cost of a ticket, correct to the nearest dollar.

$$\text{Cost of ticket} = \$ \frac{30000000}{670000}$$

$$= \$44.78$$

$$= \$45$$

[B1]

Answer (b) \$ [1]

- 4 Simplify the following

(a) $9x - 3(3x + 5y)$

$$9x - 3(3x + 5y) = 9x - 9x - 15y \quad [\text{M1}]$$

$$= -15y \quad [\text{A1}]$$

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

(b) $\frac{2x-5y}{2} - \frac{3x-2y}{3}$

$$\frac{2x-5y}{2} - \frac{3x-2y}{3} = \frac{3(2x-5y) - 2(3x-2y)}{6} \quad [\text{M1}]$$

$$= \frac{6x - 15y - 6x + 4y}{6}$$

$$= -\frac{11}{6}y \quad [\text{A1}]$$

Note: $-1.83y$ is accepted as the answer is exact.

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

- 5 Samantha can type an SMS message consisting of 143 words in 2 minutes 36 seconds.

Calculate

- (a) the number of words she can type in one minute,

$$\begin{aligned} \text{Number of words in one minute} &= \frac{143}{2\frac{36}{60}} && \text{[M1]} \\ &= 55 \text{ words} && \text{[A1]} \end{aligned}$$

Answer (a) words [2]

- (b) the time, in seconds, she uses to type one word.

$$\begin{aligned} \text{Time taken to type one word} &= \frac{60}{55} && \text{[M1]} \\ &= 1\frac{11}{12}, \frac{13}{12} \text{ or } 1.09 \text{ seconds} && \text{[A1]} \end{aligned}$$

Answer (b) seconds [2]

- 6 (a) Given that $s = \frac{v^2 - u^2}{2a}$, find the value of s when $v = 4$, $u = 3$ and $a = 7$.

$$s = \frac{v^2 - u^2}{2a} = \frac{(4)^2 - (3)^2}{2 \times 7}$$

$$= \frac{1}{2}$$

[B1]

Answer (a) $s = \dots\dots\dots$ [1]

- (b) Factorise the following:

(i) $15xy + 10y - 40yz$

$$15xy + 10y - 40yz = 5y(3x + 2 - 8z)$$

[B1]

Answer (b)(i) $\dots\dots\dots$ [1]

(ii) $3p(a - 8b) - 7q(8b - a)$

$$3p(a - 8b) - 7q(8b - a) = 3p(a - 8b) - 7q(-1)(a - 8b)$$

$$= 3p(a - 8b) + 7q(a - 8b) \quad \text{[M1]}$$

$$= (3p + 7q)(a - 8b) \quad \text{[A1]}$$

Answer (b)(ii) $\dots\dots\dots$ [2]

- 7 By selling a sofa for \$408, a retailer suffers a loss of 4%.

Find the cost price of the sofa.

Let the original price be \$x.

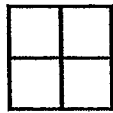
$$\text{Selling price} = 0.96x = 408$$

$$x = \frac{408}{0.96} \quad [\text{M1}]$$

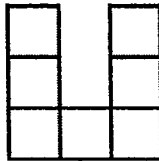
$$= 425 \quad [\text{A1}]$$

Answer \$..... [2]

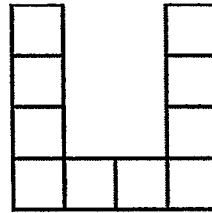
- 8 Study the pattern below.



Pattern 1



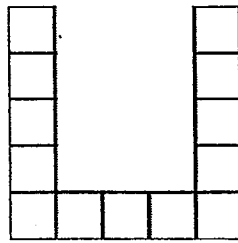
Pattern 2



Pattern 3

- (a) Draw Pattern 4.

[1]



[B1]

- (b) Write down an expression, in terms of n , for the number of squares in Pattern n .

$$T_n = 4 + 3(n-1)$$

$$= 4 + 3n - 3$$

$$= 3n + 1 \quad [\text{B1}]$$

Answer (b) [1]

- (c) There are 136 squares in Pattern N . Find the value of N .

$$3N + 1 = 136$$

$$3N = 135$$

$$N = 45 \quad [\text{B1}]$$

Answer (c) $N =$ [1]

9 Solve

(a) $3x - 5(3 - x) = 41$

$$3x - 5(3 - x) = 41$$

$$3x - 15 + 5x = 41$$

$$8x = 56$$

$$x = 7$$

[M1] expand out

[A1]

Answer (a) x = [2]

(b) $\frac{x+7}{4} = \frac{3x-5}{5}$

$$\frac{x+7}{4} = \frac{3x-5}{5}$$

$$5(x+7) = 4(3x-5) \quad \text{[M1]}$$

$$5x + 35 = 12x - 20$$

$$35 + 20 = 12x - 5x$$

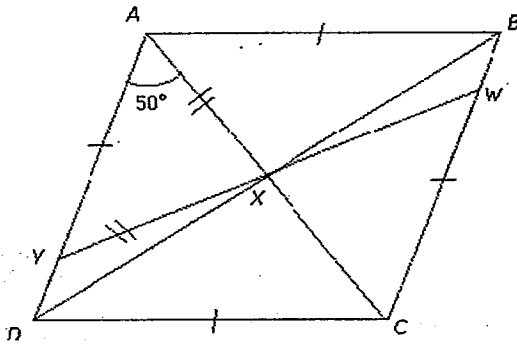
$$7x = 55$$

$$x = \frac{55}{7} \text{ or } 7\frac{6}{7} \quad \text{[A1]}$$

Note: 7.86 is not accepted as the answer is exact.

Answer (b) x = [2]

- 10 In the diagram below, $ABCD$ is a rhombus. BD cuts AC at X and $\angle CAD = 50^\circ$. Y is on AD and W is on BC such that $YX = AX$ and WXY is a straight line.



Stating your reasons clearly, calculate

- (a) $\angle AXY$,

$$\angle AYX = 50^\circ \quad (\text{base } \angle\text{s, isos } \Delta)$$

$$\angle AXY = 180^\circ - 50^\circ - 50^\circ \quad (\angle \text{ sum of } \Delta)$$

$$= 80^\circ$$

[B1]

Answer (a) $^\circ$ [1]

- (b) $\angle DXY$,

$$\angle AXD = 90^\circ \quad (\text{property of rhombus})$$

$$\angle DXY = 90^\circ - 80^\circ$$

$$= 10^\circ$$

[B1]

Answer (b) $^\circ$ [1]

- (c) $\angle BWY$,

$$\angle CXW = \angle AXY = 80^\circ \quad (\text{vert opp } \angle\text{s})$$

$$\angle ACB = \angle XAY = 50^\circ \quad (\text{alt } \angle\text{s, } AD \parallel BC) \quad [\text{M1}]$$

$$\angle BWY = \angle CXW + \angle ACB \quad (\text{ext } \angle \text{ of } \Delta)$$

$$= 80^\circ + 50^\circ$$

$$= 130^\circ$$

[A1]

$$\angle XYD = \angle AXY + \angle DAX \quad (\text{ext } \angle \text{ of } \Delta)$$

$$= 80^\circ + 50^\circ$$

$$= 130^\circ$$

OR

[M1]

$$\angle BWY = \angle XYD \quad (\text{alt } \angle\text{s, } AD \parallel BC)$$

$$= 130^\circ$$

[A1]

$$\angle XWC = \angle AYX \quad (\text{alt } \angle\text{s, } AD \parallel BC)$$

$$= 50^\circ$$

[M1]

$$\text{OR } \angle BWY = 180^\circ - \angle XWC \quad (\text{adj } \angle\text{s on st line})$$

$$= 180^\circ - 50^\circ$$

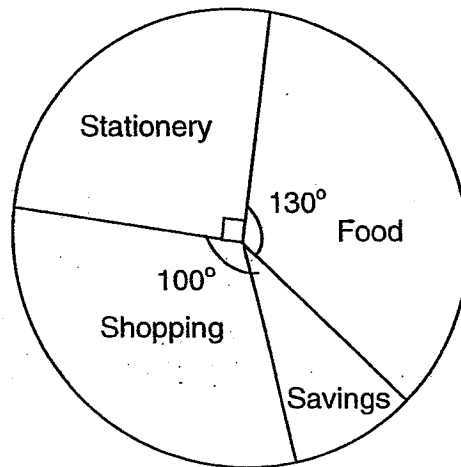
$$= 130^\circ$$

[A1]

Answer (c) $^\circ$ [2]

Note:
Accept other solution with
correct workings.

11 The pie chart illustrates John's expenditure and savings in the month of September.



(a) What percentage of his money was spent on shopping?

$$\text{Percentage spent on shopping} = \frac{100}{360} \times 100\% \quad [\text{M1}]$$

$$= 27\frac{7}{9}\% \text{ or } 27.8\% \quad [\text{A1}]$$

Answer (a) % [2]

(b) If he spent \$70 on shopping, how much money did he spend in total?

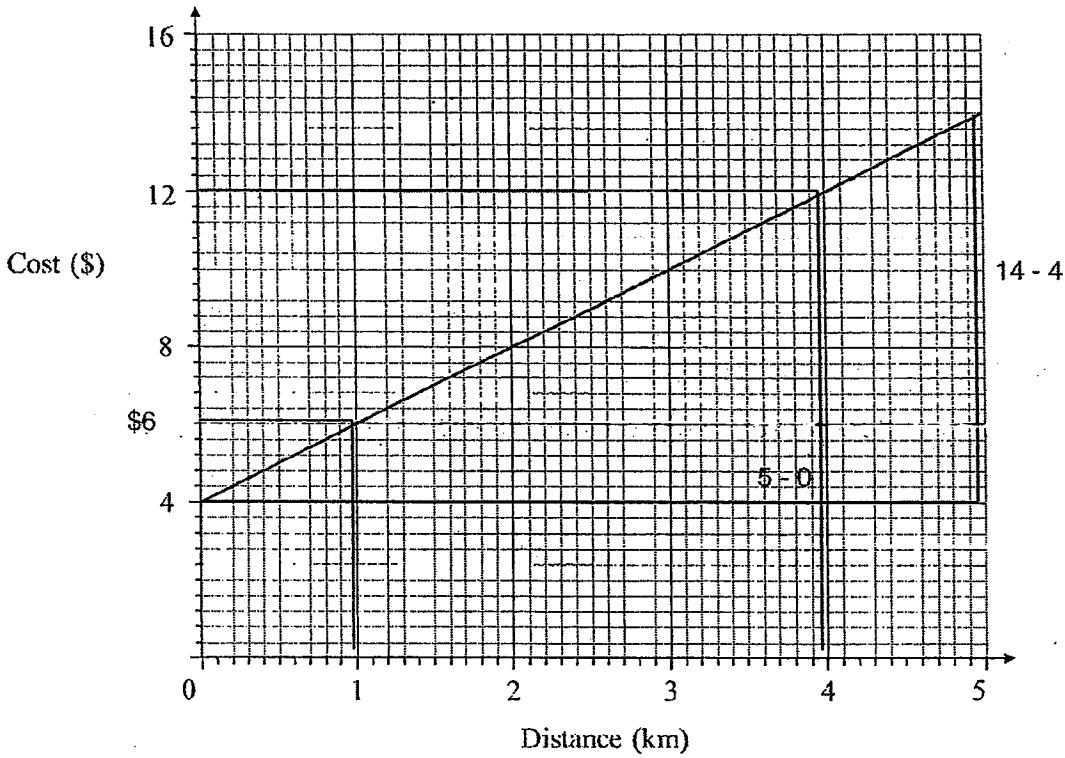
$$\begin{aligned} \text{Total spending is represented by } & 100^\circ + 90^\circ + 130^\circ \\ & = 320^\circ \quad [\text{M1}] \end{aligned}$$

100° represents \$70

$$\begin{aligned} \therefore \text{Spending} &= \frac{\$70}{100} \times 320 \\ &= \$224 \quad [\text{A1}] \end{aligned}$$

Answer (b) \$ [2]

12 The graph below shows the cost of ataxi fare for a journey up to 5kilometres.



(a) What is the taxi fare for a journey of 1 km?

From the graph, the fare is \$6.00. [B1]

Answer (a) \$ [1]

(b) If the taxi fare was \$12, how far was the journey?

From the graph, the distance travelled was 4 km. [B1]

Answer (b) km [1]

(c) Calculate the gradient of the graph.

$$\begin{aligned} \text{Gradient} &= \frac{14-4}{5-0} \\ &= 2 \end{aligned} \quad \text{[B1]}$$

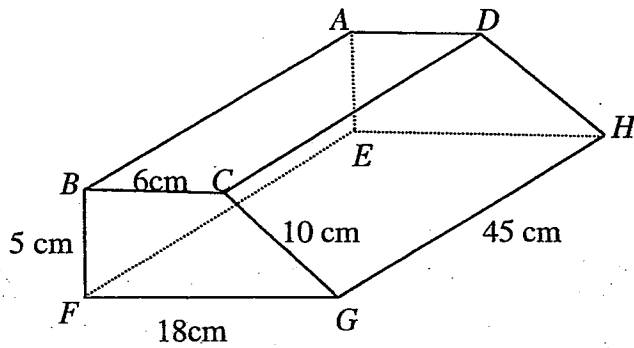
Answer (c) [1]

(d) Explain what the gradient means.

It means the cost increases at \$2 per km OR the cost per km

OR rate of change of cost with distance [B1]..... [1]

13



The diagram represents a prism. The faces of $ABCD$ and $EFGH$ are horizontal.

The faces $ABFE$, $BCGF$ and $ADHE$ are vertical.

$BC = AD = 6$ cm, $CG = DH = 10$ cm, $BF = AE = 5$ cm, $FG = EH = 18$ cm and

$GH = FE = BA = CD = 45$ cm.

Calculate

(a) the volume of the prism,

$$\begin{aligned} \text{Base area} &= \frac{1}{2}(6+18)(5) && \text{[M1]} \\ &= 60 \text{ cm}^2 \\ \text{Volume} &= 60 \times 45 && \text{[M1]} \\ &= 2700 \text{ cm}^3 && \text{[A1]} \end{aligned}$$

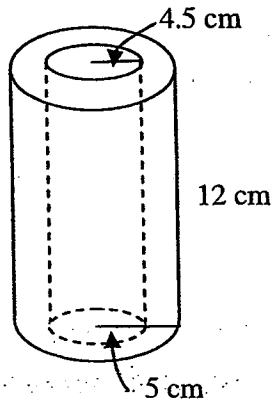
Answer (a)cm³ [3]

(b) the total surface area of the prism.

$$\begin{aligned} \text{Surface area of end faces} &= 2 \times 60 && \text{[M1]} \\ &= 120 \text{ cm}^2 \\ \text{Surface area of lateral faces} &= (5+6+10+18) \times 45 && \text{[M1]} \\ &= 1755 \text{ cm}^2 \\ \text{Total surface area} &= 120+1755 \\ &= 1875 \text{ cm}^2 && \text{[A1]} \end{aligned}$$

Answer (b)cm² [3]

- 14 The diagram shows a cylindrical pipe of height measuring 12 cm which has an internal radius of 4.5 cm and external radius of 5 cm.



Find the total surface area of the pipe.

$$\begin{aligned} \text{Surface area of end faces} &= 2 \times \pi \times (5^2 - 4.5^2) && \text{[M1]} \\ &= 29.845 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Surface area of internal and external lateral faces} &= (2 \times \pi \times 4.5 \times 12) + (2 \times \pi \times 5 \times 12) && \text{[M1]} \\ &= 716.28 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total surface area} &= 29.845 + 716.28 \\ &= 746.125 \\ &= 746 \text{ cm}^2 && \text{[A1]} \end{aligned}$$

Answer..... cm² [3]

End of Paper