Name	Register Number	Class

智行慈愿

MANJUSRI SECONDARY SCHOOL

文殊中学

End of Year Examination 2012

Subject	:	**Mathematics**
Level	:	**Secondary 1 Express**
Paper	:	**1**
Date	:	**4 Oct 2012**
Duration	:	**1 Hour**
Setter	:	**Mr Gabriel Ho**

INSTRUCTIONS TO CANDIDATES:

Write your name, class and index number in the spaces provided at the top of the page.
Answer **all** the questions in this paper.
Write your answers in the spaces provided.

INFORMATION FOR CANDIDATES:

The number of marks is given in bracket [ ] at the end of each question or part question.
Omission of essential working will result in loss of marks.

SCIENTIFIC CALCULATORS ARE NOT ALLOWED IN THIS PAPER.

If the degree of accuracy is not specified in the question and if the answer is not exact, give the answer to 3 significant figures. Give answers in degrees to 1 decimal place.
For π, use either your calculator value or 3.142.
The total marks for this paper is **40**.

Marks Obtained
40

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Answer **all** the questions.

For Examiner's use

1.(a) Express the following numbers, correct to 2 significant figures,

(i)69.528,

(ii)0.071 713.

(b) Hence **estimate**,the value of 69.528×0.071713, correct to 1 significant figure.

Answer: (a)(i) _____ [1]

(a)(ii) _____ [1]

(b) _____ [1]

2. Given that $5y \geq 17\frac{1}{2}$, state the smallest possible value of y if

(a)y is an integer,

(b)y is a prime number.

Answer: (a) _____ [1]

(b) _____ [1]

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3. A sum of money is divided in the ratio $1\frac{1}{2} : 3 : \frac{11}{2}$. If the smallest amount of money is \$192 less than the largest amount of money, find the original sum of money.

For Examiner's use

Answer: \$ _____ [2]

4. Given that $85\,995 = 3^3 \times 5 \times 7^2 \times 13$, find the smallest integer value for k where $85\,995k$ is a perfect square.

Answer: $k =$ _____ [2]

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5. (a) Factorise $4x^2y - 6xy^3$ completely.

(b) Given that $p = 64$, $q = 3$ and $r = -2$, evaluate $\sqrt[3]{p} - \frac{5q^2}{r}$.

For Examiner's use

Answer: (a) _____ [1]

(b) _____ [2]

6. (a)Solve the inequality $6x - 5x \leq -3 + (-7)$.

(b)Express $\frac{3x+1}{4} - \frac{x-5}{2}$ as a fraction in its simplest form.

Answer: (a) _____ [1]

(b) _____ [2]

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7. (a)Find the sum of the interior angles of a regular polygon with 9 sides.

(b)A second polygon has m sides. Two of its exterior angles are 44° and 52°. The remaining exterior angles are 24° each. Find the value of m.

For Examiner's use

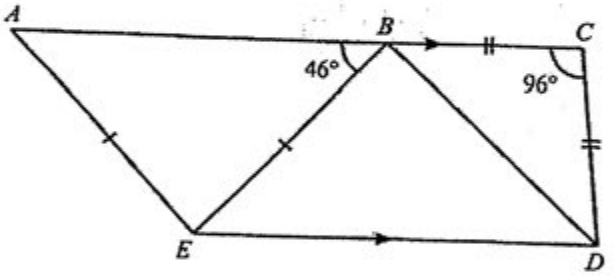
Answer: (a) _____ [1]

(b) _____ [2]

8. In the figure below, $ABCDE$ is a trapezium. ΔABE and ΔBCD are isosceles triangles. Find, stating the reason(s) clearly,

(a) $\angle DBE$,

(b) $\angle BDE$.



Answer: (a) $\angle DBE =$ _____ ° Reason: _____ [2]

(b) $\angle BDE =$ _____ ° Reason: _____ [2]

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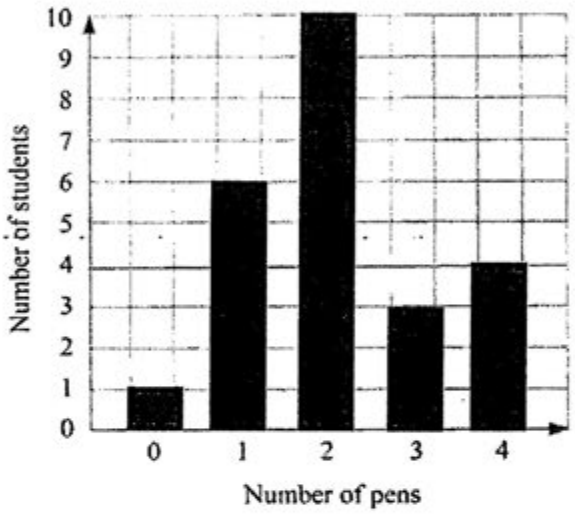
9. Each student in a class was asked how many pens they had. The results are shown in the bar graph.

For Examiner's use

(a) Find the number of students in the class.

(b)Find the proportion of students having more than 2 pens, giving your answers as a **fraction in simplest form**.

(c) The information is to be represented in a pie chart. Calculate the angle of the sector consisting of students having 3 pens.



Answer: (a) _____ students [1]

(b) _____ [1]

(c) _____ ° [2]

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For Examiner's use

10. In the space provided below,

(a) Construct a parallelogram $ABCD$ such that $AB = 7$ cm, $BC = 5.5$ cm and $\angle ABC = 60°$. [2]

(b) Hence, measure the length of BD.

(c) On the same diagram, construct the angle bisector of $\angle BCD$. [1]

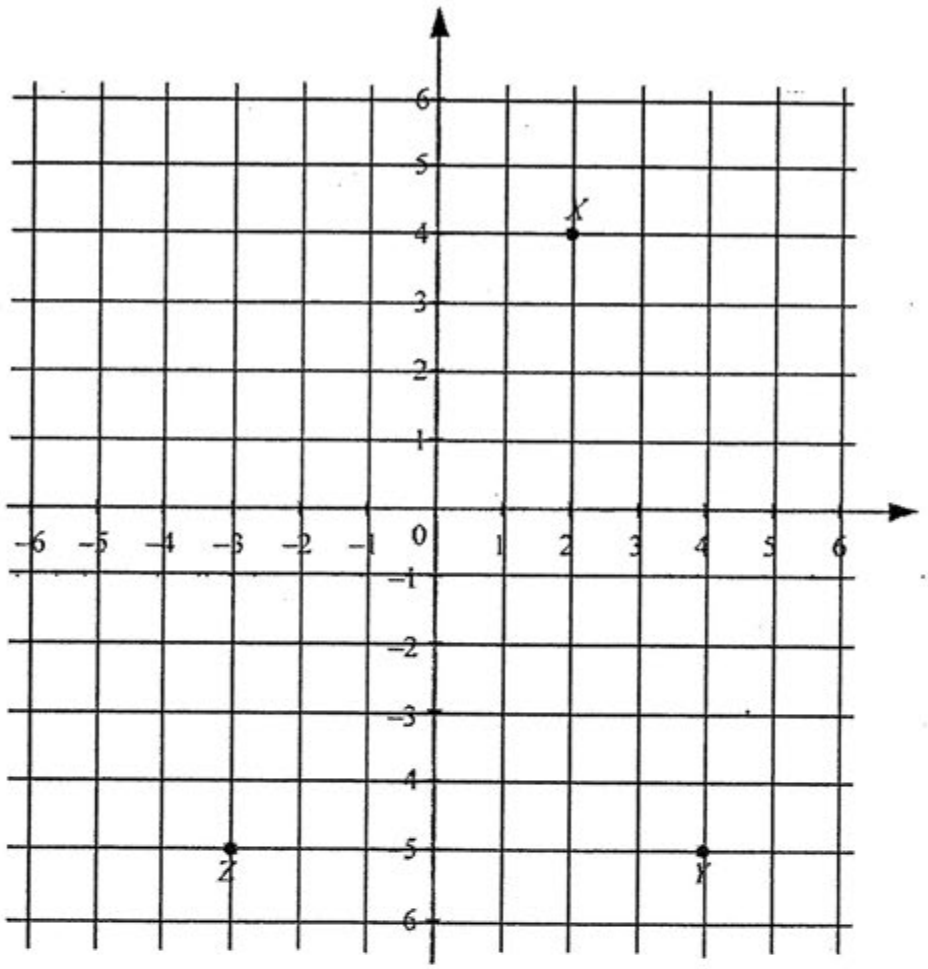
Answer for (a) and (c):

Answer: (b) $BD =$ _____ cm [1]

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11. The figure below shows the Cartesian plane.

For Examiner's use



(a) State the coordinates of points Y.

(b) Write down the coordinates of a point W such that $\angle XWZ$ is 90°

(c) Find the area of XYZ.

Answer: (a) $Y = (_____, _____)$ [1]

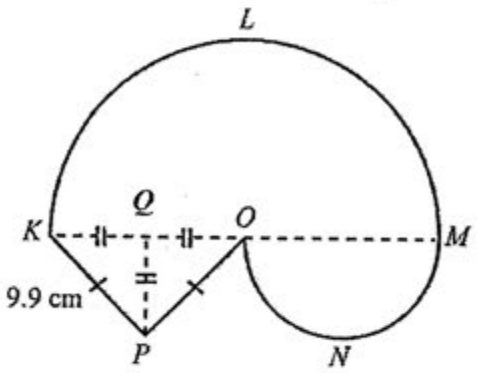
(b) $W = (_____, _____)$ [1]

(c) _____ units^2 [2]

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12. In the figure below, KLM is a semicircle of diameter 28 cm with centre at O.
MNOis another semicircle and ΔKPO is an isosceles triangle.
Given that $KQ = QO = QP$, find
(a)the perimeter of the figure in cm,
(b)the area of the figure in cm^2.

(Take $\pi = \frac{22}{7}$)



For Examiner's use

Answer: (a) _____ cm [3]

(b) _____ cm^2 [3]

**** *End of Paper* ****

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Marking Scheme:

1(a)(i) 70 (2.s.f) [B1]

1(a)(ii) 0.072 (2.s.f) [B1]

1(b) 70×0.071

$= 4.97$

$= 5$ (1sf) [B1]

2 $5y \geq 17\frac{1}{2}$

$5y \geq \frac{35}{2}$

$10y \geq 35$

$y \geq 3.5$

2(a) 4 [B1]

2(b) 5 [B1]

3 $1\frac{1}{2} : 3 : \frac{11}{2}$

$= \frac{3}{2} : \frac{6}{2} : \frac{11}{2}$

$= 3 : 6 : 11$

8 units ---------- \$192 [M1]

20 units ---------- $\frac{20}{8} \times 192$

$=$ \$480 [A1]

4 $k = 3 \times 5 \times 13$ [M1]

$= 195$ [A1]

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5(a) $4x^2y - 6xy^3$

$= 2xy(2x - 3y^2)$ [B1]

5(b)

$\sqrt[3]{p} - \frac{5q^2}{r}$

$= \sqrt[3]{64} - \frac{5 \times 3^2}{-2}$ [M1]

$= 4 - (-22.5)$

$= 26.5$ [A1]

6(a) $6x - 5x \leq -3 + (-7)$

$x \leq -10$ [B1]

6(b) $\frac{3x+1}{4} - \frac{x-5}{2}$

$= \frac{3x+1}{4} - \frac{2x-10}{4}$

$= \frac{3x+1-2x+10}{4}$ [M1]

$= \frac{x+11}{4}$ [A1]

7(a) Sum of interior angles $= (9-2) \times 180°$

$= 1260°$ [B1]

7(b) $(m-2) \times 24° + 44° + 52° = 360°$ [M1]

$(m-2) = 11$

$m = 13$ sides [A1]

8(a) $\angle CBD = \frac{180° - 96°}{2}$

$= 42°$ (IsoΔ)

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$\angle DBE = 180° - 46° - 42°$

$= 92°$ [B1]

Reason: Adj. angles on a straight line [B1]

8(b) $\angle DBE = 42°$ [B1]

Reason: Alternate angles [B1]

9(a) Number of students $= 1 + 6 + 10 + 3 + 4$

$= 24$ [B1]

9(b) Proportion of students $= \frac{3+4}{24}$

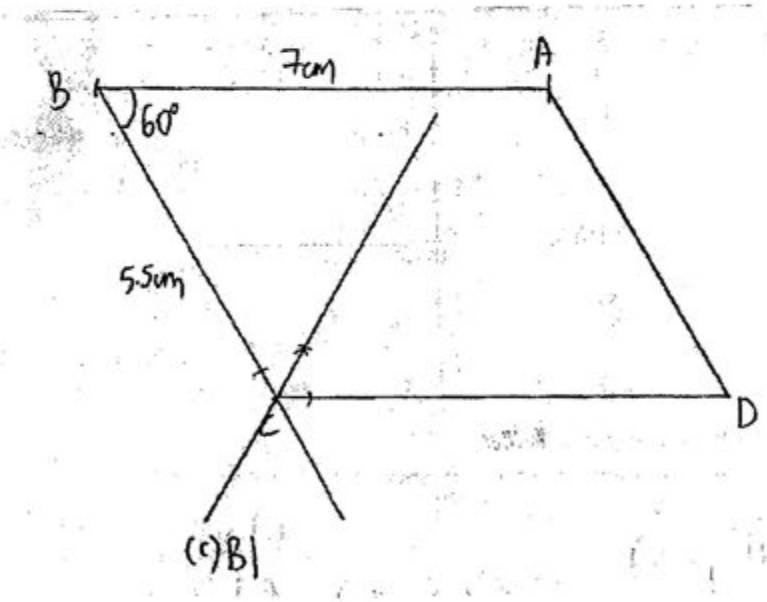
$= \frac{7}{24}$ [B1]

9(c) Angle of sector $= \frac{3}{24} \times 360°$ [M1]

$= 45°$ [A1]

10(a) Construction lines [M1]

Accuracy [A1]



10(b) $BD = (10.9 \pm 0.1)$ cm [B1]

10(c) Angle Bisector (See Diagram) [B1]

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11(a) $(4, -5)$ [B1]

11(b) $(2, -5)$ or $(-3, 4)$ or $(4, 2)$ or $(-5, -3)$ [B1]

11(c) Area of ΔXYZ $= \frac{1}{2} \times 9 \times 7$ [M1]

$= 31.5 \text{ units}^2$ [A1]

12(a) Circumference of semi-circle KLM $= \frac{1}{2} \times \frac{22}{7} \times 28$ [M1]

$= 44 \text{ cm}$

Circumference of semi-circle OMN $= \frac{1}{2} \times \frac{22}{7} \times 14$ [M1]

$= 22 \text{ cm}$

Perimeter of figure $= 44 + 22 + 9.9 + 9.9$

$= 85.8 \text{ cm}$ [A1]

12(b) Area of semi-circle KLM $= \frac{1}{2} \times \frac{22}{7} \times 14 \times 14$ [M1]

$= 308 \text{ cm}^2$

Area of semi-circle OMN $= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7$ [M1]

$= 77 \text{ cm}^2$

Area of figure $= 308 + 77 + (\frac{1}{2} \times 14 \times 7)$

$= 434 \text{ cm}^2$ [A1]

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Name	Register Number	Class

智行慈願

MANJUSRI SECONDARY SCHOOL

文 殊 中 学

END OF YEAR EXMINATION 2012

Subject:	Mathematics
Level:	Secondary 1 Express
Paper:	2
Date:	9th Oct 2012
Duration:	1 hour 30 mins
Setter:	Miss Ada Chen

INSTRUCTIONS TO CANDIDATES

Write your Name, Register Number and Class in the spaces provided above.

Write your answers and working in the separate papers provided.

All necessary working must be shown.

Omission of essential working will result in loss of marks.

Answer **all** questions.

INFORMATION FOR CANDIDATES

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

You should not spend too much time on any one question.

You are expected to use an electronic calculator for this paper.

If the degree of accuracy is not specified in the question and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

For π, use your calculator value or 3.142.

The total marks for this paper is **60**.

Marks Obtained
60

This question paper consists of 6 printed pages including the cover page.

[Turn over

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Answer **all** questions.

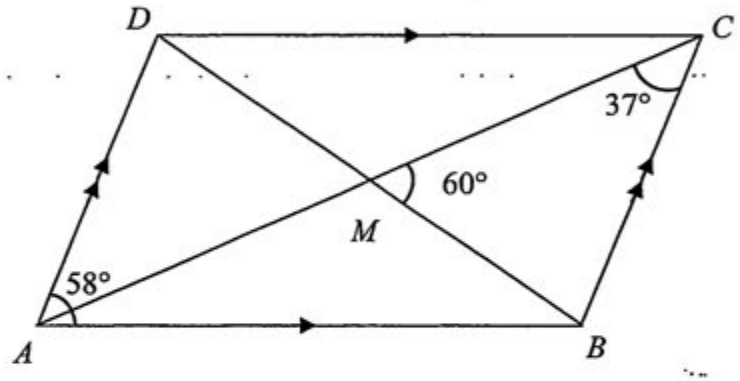
1. With the use of a calculator, evaluate

(a) $\dfrac{(12.5)^2 - \sqrt{1207}}{\left(\dfrac{8}{15}\right)^3}$, correct to 1 decimal place. [1]

(b) $\dfrac{7.421}{\sqrt[3]{14.698}} + \dfrac{\sqrt{54.6}}{2.31}$, correct to 3 significant figures. [1]

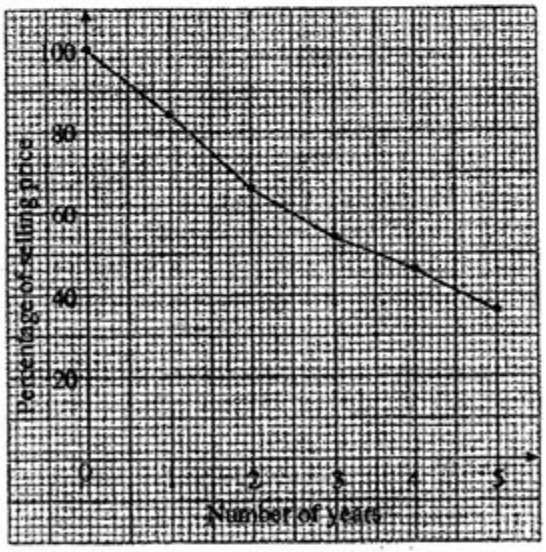
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2. $ABCD$ is a parallelogram. Find $\angle BDC$, giving your reason(s) clearly. [3]



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3. The value of a car depreciates by a certain percentage after each year. The line graph below shows the percentage of the original value of the car after each year.
For example, if a new car costs \$50 000, the value of the car becomes 85% of \$50 000 after one year.



(a) If a new car costs \$126 500, calculate the value of the car after 2.5 years. [1]

(b) If a new car costs \$90 000, how much will it depreciate after 5 years? [2]

(c) Mr Wong wants to sell his car after it loses half of its original value. When should he sell it? [1]

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4. (a) Factorise the following algebraic expression completely.

$a \times b - c \times b - d \times a + d \times c$ [2]

(b) Given an algebraic equation,

$193 \times 13 - 43 \times 13 - 7 \times 193 + 7 \times 43 = (13 - 7)(x - y)$

By factorisation, deduce the values of x and y in the equation above. [3]

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5. Study the following patterns formed by squares.

Figure 1 Figure 2 Figure 3 Figure 4

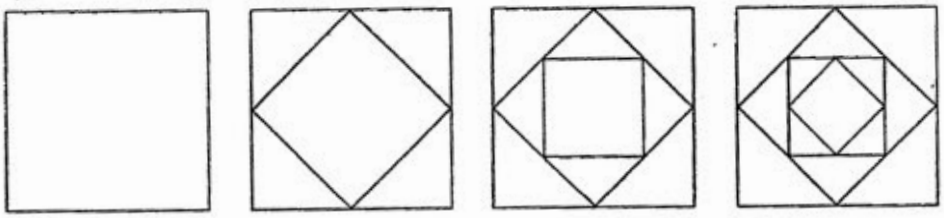


Figure no.	No of triangles
1	0
2	4
3	8
4	***a***
5	16
6	***b***
....	...
n	

(a) Find the value of a and b in the table below. [2]

(b) Find the number of triangles in the n^{th} Figure. [1]

(c) If there are 300 triangles in the n^{th} Figure, find the value of n. [1]

(d) Explain if it is possible to have 1001 triangles in a Figure. [1]

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6. The table below shows the menu in a restaurant.
John ordered 2 plates of steak house salad, 5 baskets of calamari, 2 servings of fillet and 3 pieces of cheesecake. The GST levied is 7%.

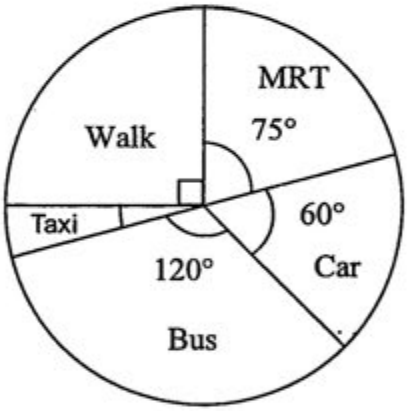
MENU	
STEAK HOUSE SALAD	$12.50/plate
CALAMARI	$8.90/basket
RIBEYE	$24.50/serving
T-BONE	$35.50/serving
FILLET	$17.90/serving
CHEESECAKE	$6.90/piece

(a) Calculate the total bill, inclusive of GST, that John is required to pay for his order. Correct your answer to 2 decimal places. [3]

(b) The restaurant also imposes x% of service charge on the cost of food items exclusive of 7% GST. Calculate the value of x if John paid $153.72 to the restaurant. [3]

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7. A survey was conducted on a group of students. They were asked how they travelled to school. The information they gave was represented on the pie chart shown below.



(a) Calculate the fraction of students who walk to school. [1]

(b) Given that the number of students who took bus to school is 24, calculate the number of students who took MRT to school. [2]

(c) Calculate the total number of students who took this survey. [1]

(d) Calculate the percentage of students who took taxi to school.
(Correct your answer to 1 decimal place.) [2]

(e) State an advantage of representing the survey result in a pie chart. [1]

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8. Nick walks at an average speed of x km/h for 30 minutes.
He then cycles at an average speed of $(x + 20)$ km/h for 45 minutes.

(a) Write down an expression, in terms of x, for the distance that Nick walked in km. [1]

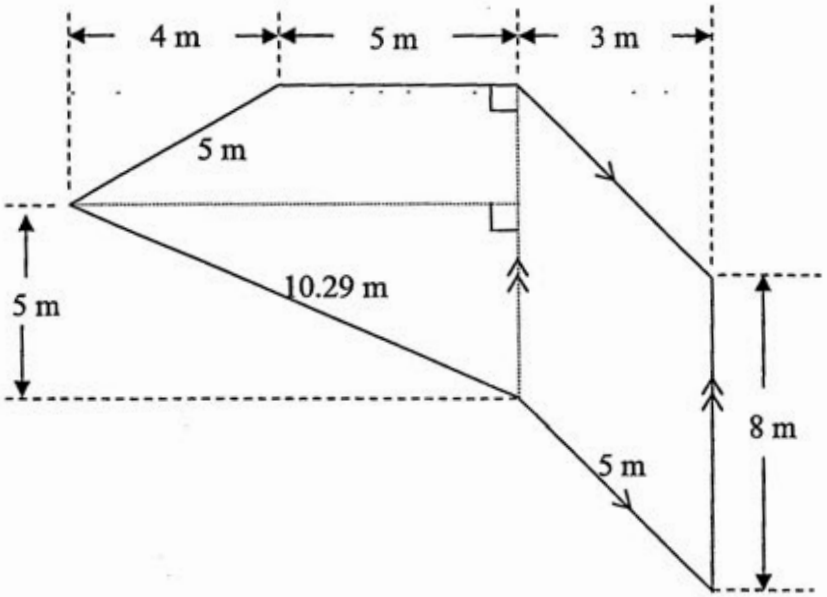
(b) Write down an expression, in terms of x, for the distance that Nick cycled in km. [1]

(c) Given that Nick walked and cycled a total distance of 20 km. Find the value of x. [3]

(d) Find Nick's average speed for the whole journey in km/h. [2]

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9. (a) The diagram below shows a plan view of the wing of a stealth bomber.

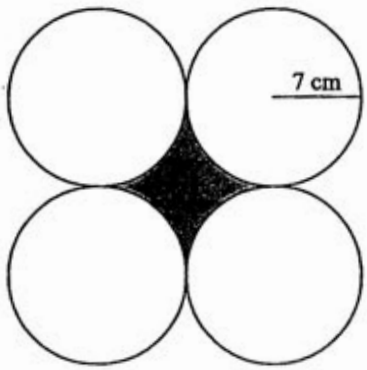


Calculate

(i) the perimeter of the wing of the stealth bomber, [2]

(ii) the area of the wing of the stealth bomber. [4]

(b) In the diagram, four equal circles with radius 7 cm are arranged together. By taking $\pi = \frac{22}{7}$, find the shaded area between these circles. [4]



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10. Diagram I shows the top view of a prism in which the shaded region represents the hollow part. Diagram II shows the prism of height 16 cm with a hollow cylindrical pipe being drilled through.

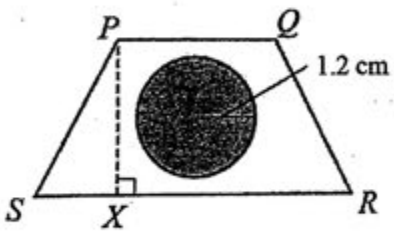


Diagram I

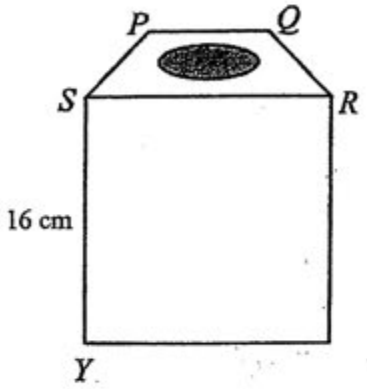


Diagram II

Given that $PQ = 5$ cm, $QR = PS = 5$ cm, $PX = 4$ cm, $SR = 11$ cm and $SY = 16$ cm. The radius of the shaded circle is 1.2 cm. By taking π as 3.142, calculate

(a) the perimeter of the unshaded region in Diagram I, [3]

(b) the area of unshaded region in Diagram I, [3]

(c) the total surface area of the prism in Diagram II, [2]

(d) the volume of the material which is used to make this prism. [2]

(e) the cost, correct to the nearest cent, to paint the total surface area of the prism, given that the cost for painting the prism is \$0.02 for one square centimeter. [1]

END OF PAPER

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2012 EOY SEC 1 EXPRESS PAPER 2
Answer Key

1	(a) 801.0 (1 d.p.) (b) 6.23 (3 s.f.)	B1 B1
2	$\angle BCD = \angle BAD = 58°$ (opp. $\angle$s of parallogram) $\angle ACD = 58° - 37° = 21°$ $\therefore \angle BDC = \angle BMC - \angle ACD$ (ext. $\angle$ = sum of int. opp. $\angle$s) $= 39°$ **Alternatively,** $\angle DAC = 37°$ (alt $\angle$, AD//BC) $\angle DMA = 60°$ (vert opp $\angle$) $\angle ADM = 180° - 37° - 60°$ $= 83°$ (sum of $\angle$s in a Δ) $\therefore \angle BDC = 180° - 58° - 83°$ $= 39°$ (int $\angle$, AB//DC)	M1 M1 A1 M1 M1 A1
3	(a) $126\,000 \times \frac{60}{100} = \$75\,900$ (b) $90\,000 \times \left(1 - \frac{36}{100}\right)$ $= \$57\,600$ (c) 3.5 years	B1 M1 A1 B1
4	(a) $a \times b - c \times b - d \times a + d \times c$ $= b(a-c) - d(a-c)$ $= (b-d)(a-c)$ (b) $193 \times 13 - 43 \times 13 - 7 \times 193 + 7 \times 43$ $= 13(193-43) - 7(193-43)$ $= (13-7)(193-43)$ $x = 193$ and $y = 43$	 M1 A1 M1 A1, A1
5	(a) $a = 12, b = 20$ (b) *No. of triangles in the* n^{th} *Figure* $= 4(n-1)$	B1, B1 B1

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	(c) $4(n-1)=300$ $n-1=75$ $n=76$ (d) It is not possible to have 1001 triangles in a figure because 1001 is not divisible by 4.	 B1 B1
6	(a) total bill excluding GST $=(2\times12.50)+(5\times8.90)+(2\times17.90)+(3\times6.90)$ $=\$126$ total bill $=126\times\left(1+\frac{7}{100}\right)$ $=\$134.82$ (nearest cent) (b) Service charge $=126\times x\%$ GST $=126\times7\%=\$8.82$ $153.72=126+126\times x\%+8.82$ $126\times x\% = 18.90$ $x\%=15\%$ $x=15$	M1 M1 A1 M1 M1 A1
7	(a) Fraction of students who walk to school $=\frac{90°}{360°}$ $=\frac{1}{4}$ (b) Number of students who tool MRT $=\frac{75°}{120°}\times24$ $=15$ (c) Total number of students who took this survey $=24\times3$ $=72$ students	 M1 A1 B1 B1

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	(d) $360° - 90° - 75° - 60° - 120° = 15°$ Percentage of students who took taxi $= \frac{15°}{360°} \times 100\%$ $= 4.2\%$ (1 d.p.) (e) It can compare the parts with the whole.	 M1 A1 B1
8	(a) $\frac{1}{2}x$ km (b) $\frac{3}{4}(x+20)$ km (c) $\frac{1}{2}x + \frac{3}{4}(x+20) = 20$ $2x + 3(x+20) = 80$ $2x + 3x + 60 = 80$ $5x = 20$ $x = 4$ (d) Nick's average speed for the whole journey $= \frac{20}{\frac{1}{2} + \frac{3}{4}}$ $= 16$ km/h	B1 B1 M1 M1 A1 M1 A1
9	(a)(i) Perimeter $= 5 + 5 + 5 + 8 + 5 + 10.29$ $= 38.29$ m $= 38.3$ m (3 s.f.)	 M1 A1

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(a) (ii)

Area of the trapzium $= \frac{1}{2}(5+9)\times 3$ **M1**

$= 21.0\,\text{m}^2$

Area of the parallelogram $= 8\times 3$ **M1**

$= 24.0\,\text{m}^2$

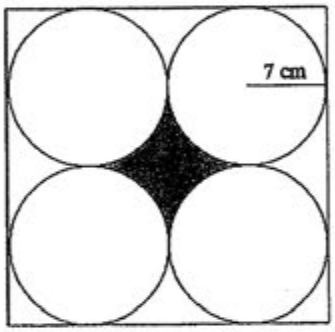
Area of triangle $= \frac{1}{2}\times 9\times 5$ **M1**

$= 22.5\,\text{m}^2$

Total Area $= 21.0 + 24.0 + 22.5$

$= 67.5\,\text{m}^2$ **A1**

(b) Draw a square outside the four circles, with the length of side = 28 cm



Area of the 4 circle $= 4\times\frac{22}{7}\times 7^2$

$= 616\,\text{cm}^2$ **M1**

Area of the square $= 28\times 28$

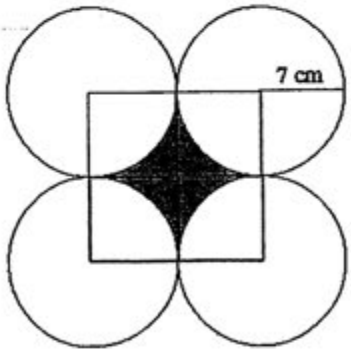
$= 784\,\text{cm}^2$ **M1**

Area of the shaded region $= \frac{4}{16}\times(784-616)$ **M1**

$= 42\,\text{cm}^2$ **A1**

Alternatively,

Draw a square with the length of side = 7 cm



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	Area of a quadrant $= \frac{1}{4} \times \frac{22}{7} \times 7^2$ $= 38.5 \text{ cm}^2$	M1
	Area of the square $= 7 \times 7$ $= 49 \text{ cm}^2$	M1
	Area of the shaded region $= 4 \times (49 - 38.5)$ $= 42 \text{ cm}^2$	M1 A1
10	(a) Perimeter of the trapezium $= 5 + 5 + 5 + 11$ $= 26 \text{ cm}$	M1
	Perimeter of the circle $= 2 \times 3.142 \times 1.2$ $= 7.5408 \text{ cm}$	M1
	Perimeter of unshaded region $= 26 + 7.5408$ $= 33.5408 \text{ cm}$ $= 33.5 \text{ cm (3 s. f.)}$	A1
	(b) Area of the trapezium $= \frac{1}{2} \times (5 + 11) \times 4$ $= 32 \text{ cm}^2$	M1
	Area of the circle $= 3.142 \times 1.2^2$ $= 4.52448 \text{ cm}^2$	M1
	Area of the unshaded region $= 32 - 4.52448$ $= 27.47552 \text{ cm}^2$ $= 27.5 \text{ cm}^2$	A1
	(c) Total surface area $= (2 \times 27.47552) + [3 \times (5 \times 16)] + (11 \times 16) + (2 \times 3.142 \times 1.2 \times 16)$	M1
	$= 591.60384 \text{ cm}^2$ $= 592 \text{ cm}^2 \text{ (3 s. f.)}$	A1
	(d) Volume of the prism $= 27.47552 \times 16$	M1
	$= 439.60832 \text{ cm}^3$ $= 440 \text{ cm}^3 \text{ (3 s. f.)}$	A1

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	(e) Cost = 591.60384×0.02 $= 11.8321$ = \$11.83 (nearest cent) **END OF MARKING SCHEME**	**B1**

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