

Name : _____

Teacher : _____

SYDNEY TECHNICAL HIGH SCHOOL



YEAR 9 YEARLY EXAMINATION 2009

MATHEMATICS

PAPER A

Instructions

- Time allowed 65 minutes
- Show all necessary working
- Use black or blue pen
- Calculators may be used
- All questions are worth 1 mark unless indicated otherwise

Question 1	Question 2	Question 3	Question 4	Question 5	TOTAL

Question 1 (13 marks)

Answers

a. expand $(2a + 1)(a - 4)$	
b. Lily is normally paid \$14.80 per hour for the first 7 hours of a day and then time and a half rates after this. How much is she paid for working 10 hours in one day ?	
c. Find the co ordinates of the midpoint of the interval from $(4, 13)$ to $(-2, 4)$	
d. Name two quadrilaterals whose diagonals meet at right angles.	
e. Solve $6x - 5 = 2x + 15$	
f. Simplify $\sqrt{63} - \sqrt{28}$	
g. Evaluate correct to 3 significant figures $\sqrt{\frac{215.2}{8.2^2 - 3.6}}$	
h. Simplify the ratio $2 : 3\frac{1}{4}$	
i. A coin is tossed twice. What is the probability of getting two tails ?	

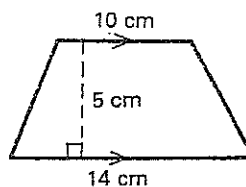
j. Solve $6(2x-1)-(x-5)=32$

k. Simplify $5x^0y^2 \div 10y^{-1}$

- l. In a class of 30 students, 5 do not study Japanese or French, 21 study Japanese and 16 study French.

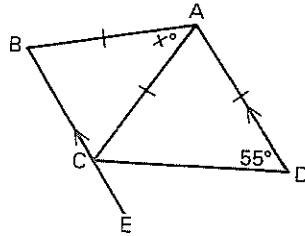
If a student is selected at random from this class, what is the probability that they study French but not Japanese ?

- m. Find the area of the following



Question 2 (13 marks)

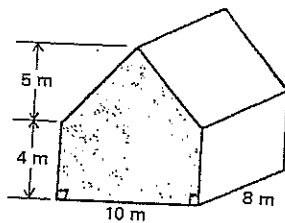
Answers

a. Simplify $5\sqrt{8} \times 2\sqrt{2}$	
b. Fred is paid a retainer of \$120 per week plus a commission of 4% of all sales above \$5000. How much is he paid in a week in which he sells \$19 000 worth of goods ?	
c. John pays \$1984 for a plasma TV after receiving a discount of 20% off the marked price. What was the marked price of the TV ?	
d. Simplify $(3a^4)^2 \times 4a^6$	
e. Find the exact distance between the points $(-1,8)$ and $(5,4)$.	
f. Express 940 million in scientific notation.	
g. Graph the solution of the inequality $2x - 6 < 8$ on a number line.	
h. Find the value of a if $\frac{1}{\sqrt{x}} = x^a$	
<p>i. Find the value of x.</p> <div style="text-align: center;">  <p>$AB = AC = AD$</p> </div>	

- j. A motor car travels 8 kilometres on one litre of petrol. How many litres is this per 100 kilometres ?

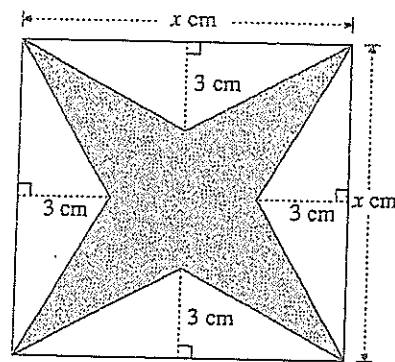
- k. Find the equation of the line which has a gradient of 3 and passes through the point $(2, -4)$.

- l. Find the volume of the following prism



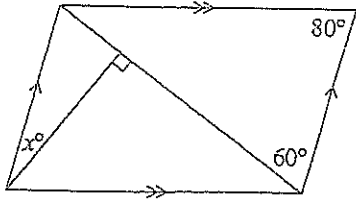
- m. A four-pointed star is made from a square as shown below.

Find an expression for the area of the Star in terms of x .



Question 3 (13 marks)

Answers

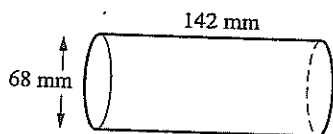
a. Expand $(3x + 5)^2$	
b. A shop buys a pair of shoes for \$48 and sells them for \$90. Calculate the profit as a percentage of the cost price.	
c. Simplify $3\sqrt{2} - \sqrt{3} + \sqrt{2} + 2\sqrt{3}$.	
d. Find the gradient of the line $x + 5y - 5 = 0$.	
e. If $400 = 2^a \times 5^b$, find the values of a and b .	
f. Simplify $\frac{2x}{5} + \frac{2x}{3}$	
g. If $8 \times 2^x = 2^\Delta$ find an expression for Δ in terms of x .	
h. How many four-digit numbers contain only the digits 1 and 2 and each of them at least once ?	
i. Find the value of x . 	

j. Make G the subject of the formula

$$E = 1 - \sqrt{\frac{G}{R}}$$

k. Solve $\frac{m}{5} = \frac{m}{3} - 2$

l. Find the surface area of the following cylinder (correct to the nearest square millimetre).

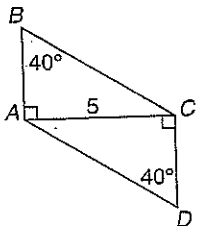


m. A 2 digit number is to be formed at random from the digits 3, 4, 5 and 8. No digit is used twice.

Find the probability that the number formed is greater than 53.

Question 5 (13 marks)

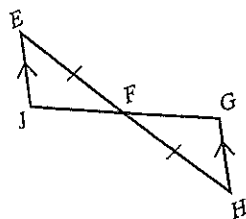
Answers

a. Expand and simplify $(2\sqrt{6} + 1)(\sqrt{6} + 2)$	
b. If the point $(4,1)$ lies on the line $2x + ay + 6 = 0$ find the value of a .	
c. Write an algebraic expression for : "Three times the sum of a and b ".	
d. Find the coordinates of the point of intersection of the line $x - 2y - 4 = 0$ and the x axis ?	
e. A number is selected at random from the digits $1, 2, 3, 4, 5, 6, 7, 8, 9$ What is the probability that this number is even or a multiple of 3 ?	
f. What is the equation of the line which passes through the point $(-2, -5)$ and is parallel to the x axis ?	
g. Find the value of m if the lines $3x + y + 9 = 0$ and $y = mx + 6$ are perpendicular.	
h. The retail price of an item is \$308, including GST of 10%. How much GST is included in the retail price ?	
i. Which test would be used to show that triangle ABC is congruent to triangle CDA ? 	

k. Find integers a and b such that

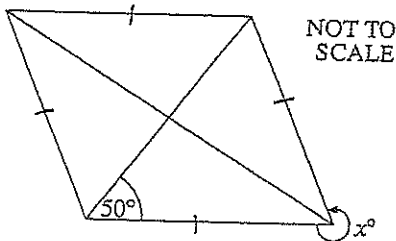
$$(2 - \sqrt{5})^2 = a - \sqrt{b} \quad (2 \text{ marks})$$

1. Show that triangle EFJ is congruent to triangle HFG. (2 marks)



Question 4 (13 marks)

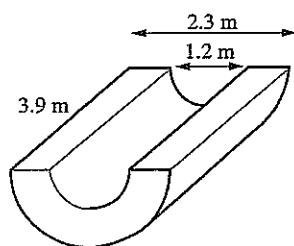
Answers

a. Find the gradient of the line joining the points (6,1) and (3,7).	
b. Find the surface area of a cube with a volume of 2744 cm^3 .	
c. Solve $1 - 4x > 21$	
d. Simplify $12\sqrt{6} \div 4\sqrt{2}$	
e. Give an example of a number which would be the same when rounded to either 3 decimal places or 3 significant figures.	
f. Express $\frac{\sqrt{5}}{4\sqrt{2}}$ with a rational denominator	
g. Evaluate $x^3 - 3x^2 + x - 1$ when $x = -2$.	
h. How many different isosceles triangles of perimeter 25 units can be formed with all sides a whole number of units ?	
i. Find the value of x. <div style="text-align: center;">  </div>	

j. Solve $10 - \frac{2x}{x+1} = 2$

k. On a number plane, shade the region described by $y \leq 2x + 1$.

l. Find the volume of the following solid (correct to 1 decimal place)



m. Find the area enclosed by the lines

$x + y = 6$, $x = 0$, $y = 0$ and $y = 4$.

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Question 1	Question 2	Question 3	Question 4	Question 5	TOTAL

Question 1 (13 marks)

Answers

a. expand $(2a+1)(a-4)$	$2a^2 - 7a - 4$
b. Lily is normally paid \$14.80 per hour for the first 7 hours of a day and then time and a half rates after this. How much is she paid for working 10 hours in one day?	\$ 170.20
c. Find the co ordinates of the midpoint of the interval from (4, 13) to (-2, 4)	$(1, 8\frac{1}{2})$
d. Name two quadrilaterals whose diagonals meet at right angles.	square rhombus kite
e. Solve $6x - 5 = 2x + 15$	$x = 5$
f. Simplify $\sqrt{63} - \sqrt{28}$	$\sqrt{7}$
g. Evaluate correct to 3 significant figures $\sqrt{\frac{215.2}{8.2^2 - 3.6}}$	1.84
h. Simplify the ratio $2 : 3\frac{1}{4}$	8 : 13
i. A coin is tossed twice. What is the probability of getting two tails?	$\frac{1}{4}$

j. Solve $6(2x-1)-(x-5)=32$

$$12x - 6 - x + 5 = 32$$

$$11x - 1 = 32$$

$$11x = 33$$

$$x = 3$$

k. Simplify $5x^0y^2 \div 10y^{-1}$

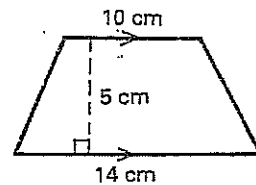
$$\frac{y^3}{2}$$

1. In a class of 30 students, 5 do not study Japanese or French, 21 study Japanese and 16 study French.

If a student is selected at random from this class, what is the probability that they study French but not Japanese?

$$\frac{4}{30} = \frac{2}{15}$$

- m. Find the area of the following

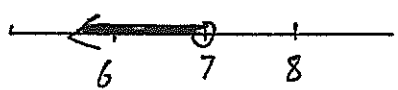
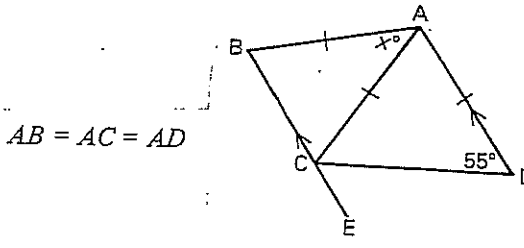


$$A = \frac{5}{2} (10 + 14)$$

$$= 60 \text{ cm}^2$$

Question 2 (13 marks)

Answers

a. Simplify $5\sqrt{8} \times 2\sqrt{2}$	40
b. Fred is paid a retainer of \$120 per week plus a commission of 4% of all sales above \$5000. How much is he paid in a week in which he sells \$19 000 worth of goods?	\$680
c. John pays \$1984 for a plasma TV after receiving a discount of 20% off the marked price. What was the marked price of the TV?	\$2480
d. Simplify $(3a^4)^2 \times 4a^6$	$36a^{14}$
e. Find the exact distance between the points $(-1, 8)$ and $(5, 4)$.	$\sqrt{52}$
f. Express 940 million in scientific notation.	9.4×10^8
g. Graph the solution of the inequality $2x - 6 < 8$ on a number line.	
h. Find the value of a if $\frac{1}{\sqrt{x}} = x^a$	$a = -\frac{1}{2}$
i. Find the value of x . 	40°

- j. A motor car travels 8 kilometres on one litre of petrol. How many litres is this per 100 kilometres?

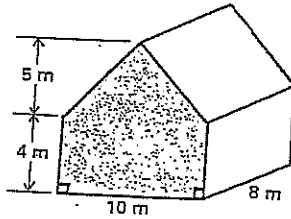
$$12.5 \text{ L} / 100 \text{ km}$$

- k. Find the equation of the line which has a gradient of 3 and passes through the point $(2, -4)$.

$$y + 4 = 3(x - 2)$$

$$y = 3x - 10$$

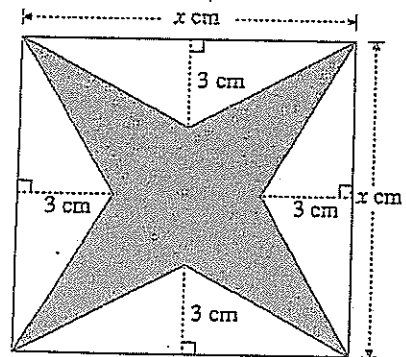
- l. Find the volume of the following prism



$$520 \text{ m}^3$$

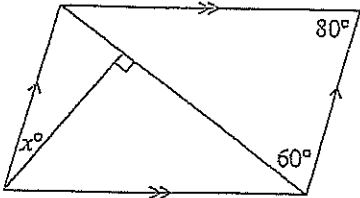
- m. A four-pointed star is made from a square as shown below.

Find an expression for the area of the Star in terms of x .



$$x^2 - 6x$$

Question 3 (13 marks)

Answers	
a. Expand $(3x+5)^2$	$9x^2 + 30x + 25$
b. A shop buys a pair of shoes for \$48 and sells them for \$90. Calculate the profit as a percentage of the cost price.	$87\frac{1}{2}\%$
c. Simplify $3\sqrt{2} - \sqrt{3} + \sqrt{2} + 2\sqrt{3}$.	$4\sqrt{2} + \sqrt{3}$
d. Find the gradient of the line $x+5y-5=0$.	$-\frac{1}{5}$
e. If $400 = 2^a \times 5^b$, find the values of a and b .	$a=4$ $b=2$
f. Simplify $\frac{2x}{5} + \frac{2x}{3}$	$\frac{16x}{15}$
g. If $8 \times 2^x = 2^\Delta$ find an expression for Δ in terms of x .	$\Delta = x + 3$
h. How many four-digit numbers contain only the digits 1 and 2 and each of them at least once?	14
i. Find the value of x . 	$x = 30$

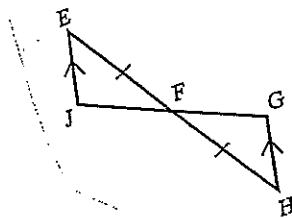
k. Find integers a and b such that

$$(2 - \sqrt{5})^2 = a - \sqrt{b} \quad (2 \text{ marks})$$

$$a = 9$$

$$b = 80$$

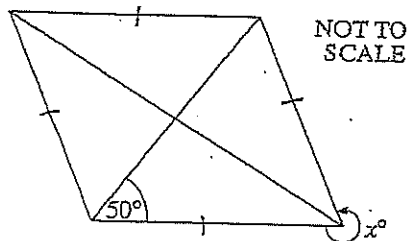
l. Show that triangle EFJ is congruent to triangle HFG. (2 marks)



Question 4 (13 marks)

Answers

a. Find the gradient of the line joining the points (6,1) and (3,7).	-2
b. Find the surface area of a cube with a volume of 2744 cm^3 .	1176 cm^2
c. Solve $1 - 4x > 21$	$x < -5$
d. Simplify $12\sqrt{6} \div 4\sqrt{2}$	$3\sqrt{3}$
e. Give an example of a number which would be the same when rounded to either 3 decimal places or 3 significant figures.	0.4381 or many possible solutions.
f. Express $\frac{\sqrt{5}}{4\sqrt{2}}$ with a rational denominator	$\frac{\sqrt{10}}{8}$
g. Evaluate $x^3 - 3x^2 + x - 1$ when $x = -2$.	-23
h. How many different isosceles triangles of perimeter 25 units can be formed with all sides a whole number of units?	6
i. Find the value of x .	280



j. Make G the subject of the formula

$$E = 1 - \sqrt{\frac{G}{R}}$$

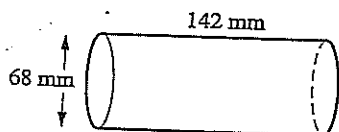
$$G = R(1-E)^2$$

$$G = R(E-1)^2$$

k. Solve $\frac{m}{5} = \frac{m}{3} - 2$

$$m = 15$$

l. Find the surface area of the following cylinder (correct to the nearest square millimetre).



$$37599 \text{ mm}^2$$

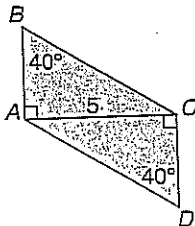
m. A 2 digit number is to be formed at random from the digits 3, 4, 5 and 8. No digit is used twice.

Find the probability that the number formed is greater than 53.

$$\frac{5}{12}$$

Question 5 (13 marks)

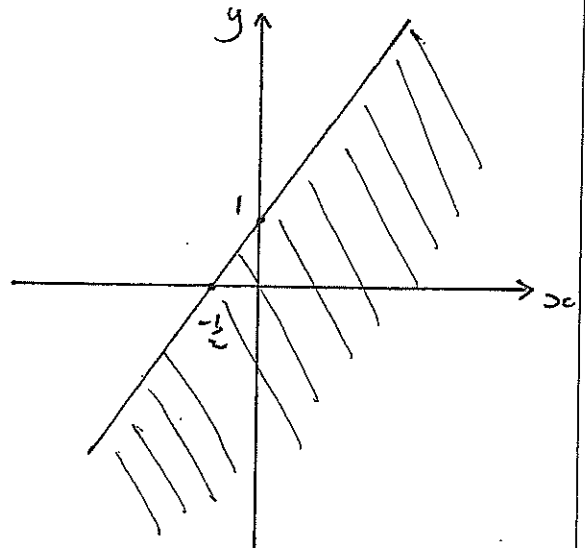
Answers

a. Expand and simplify $(2\sqrt{6} + 1)(\sqrt{6} + 2)$	$14 + 5\sqrt{6}$
b. If the point $(4, 1)$ lies on the line $2x + ay + 6 = 0$ find the value of a .	$a = -14$
c. Write an algebraic expression for : "Three times the sum of a and b ".	$3(a + b)$
d. Find the coordinates of the point of intersection of the line $x - 2y - 4 = 0$ and the x axis ?	$(4, 0)$
e. A number is selected at random from the digits $1, 2, 3, 4, 5, 6, 7, 8, 9$ What is the probability that this number is even or a multiple of 3 ?	$\frac{2}{3}$
f. What is the equation of the line which passes through the point $(-2, -5)$ and is parallel to the x axis ?	$y = -5$
g. Find the value of m if the lines $3x + y + 9 = 0$ and $y = mx + 6$ are perpendicular.	$m = \frac{1}{3}$
h. The retail price of an item is \$308, including GST of 10%. How much GST is included in the retail price ?	\$ 28
i. Which test would be used to show that triangle ABC is congruent to triangle CDA ? 	AAS

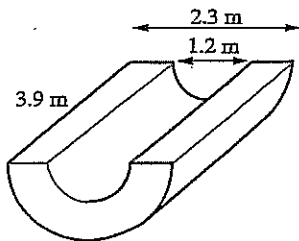
j. Solve $10 - \frac{2x}{x+1} = 2$

$$x = -\frac{4}{3}$$

k. On a number plane, shade the region described by $y \leq 2x + 1$.



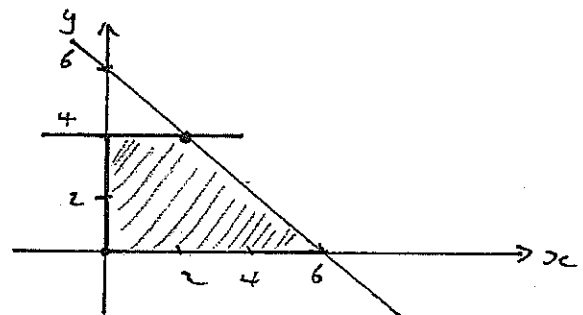
l. Find the volume of the following solid (correct to 1 decimal place)



$$\begin{aligned} V &= \frac{1}{2} [\pi R^2 h - \pi r^2 h] \\ &= \frac{\pi \times 3.9}{2} [1.4^2 - 0.6^2] \\ &= 5.9 \text{ m}^3 \end{aligned}$$

m. Find the area enclosed by the lines

$$x + y = 6, \quad x = 0, \quad y = 0 \quad \text{and} \quad y = 4.$$



$$\begin{aligned} A &= \frac{4}{2} (2 + 6) \\ &= 16 \text{ sq units} \end{aligned}$$

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