Sydney Girls High School

Mathematics

Year 9 Assessment Task 1

2015

Time Allowed: 60 minutes plus 5 minutes reading time

Topics: Equations and Inequalities; Length, Area, Surface Area and Volume; Computation and Financial mathematics; Indices and Surds.

Instructions:

- There are FIVE questions, of equal value.
- All questions are to be attempted.
- Board-approved calculators may be used in all parts of the test.
- Full marks may not be awarded for careless or incomplete setting out.
- Diagrams are NOT drawn to scale.

TOTAL MARKS: 70

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Question 1

a) Write the following in scientific notation: *2*

i) 0.000 0749

ii) 280 000 000

b) Evaluate $\frac{(2.1\times10^{2})^{3}}{\sqrt{17.12}}$ correct to 3 significant figures. *2*

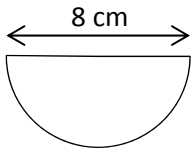
c) Simplify the following : *6*

i) $2\sqrt{8}\times\sqrt{3}$

ii) $8\sqrt{5}-2\sqrt{20}$

iii) $8a^{5}\div 66a^{0}$

d) Find the exact value of the perimeter of the semi-circle. *2*



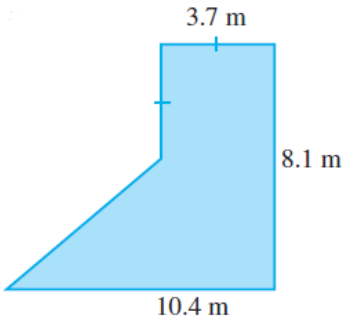
e) If $I=\frac{PRN}{100}$, find the value for I if $P=160,\ R=11$ and $N=9.$ *2*

Question 2

a) In a successful year, a manager gave each of his employees a 2.5% bonus on their annual income. Find the bonus received by Corey who earns $1327.50 per week. *2*

b) A computer purchased for $2400 depreciates annually at a rate of 17%.
How much will it depreciate in value in its third year? *2*

c) Find the area of the following shape. *2*

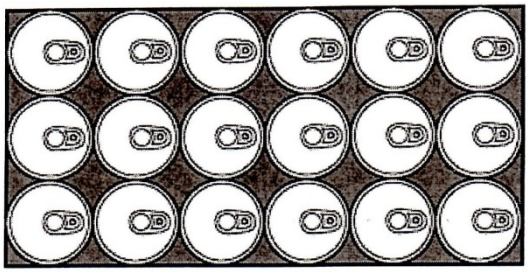


d) Solve the following: *4*

i) $6(8-3m)<-24$

ii) $\frac{x-2}{5}+8=11$

e) Cans of soft drink are sold in a carton of 18, arranged in three rows of six. *4*



i) If each can has a radius of 3.25cm, find the dimensions of the rectangular base of the carton. (That is, length and width)

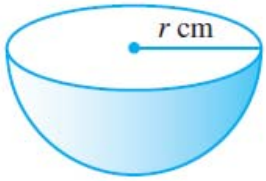
ii) What area of the base is not covered by cans? Answer to the nearest whole number.

Question 3

a) Simplify $\left(4a^3 \times 5a^4\right) \div 10a^5$. *2*

b) Solve $\frac{y}{2} - 3y \geq 4$ and graph the solution on a number line. *3*

c) *2*



The volume V cm^3 of a hemisphere with radius r cm is given by the formula $V = \frac{2}{3}\pi r^3$.

Find the length of the radius if the hemisphere has a volume of 18π cm^3.

d) Expand and simplify the following: *4*

i) $20 - 4(x-2) + 5x$

ii) $\left(7+\sqrt{3}\right)\left(7-\sqrt{3}\right)$

iii) $(2x-1)(x+5)$

e) Solve these simultaneous equations, by the method of substitution. *3*

$$2x - y = 6$$
$$3x + 4y = -46$$

Question 4

a) Make u the subject in $s = \dfrac{v^2 - u^2}{2}$. *2*

b) *3*

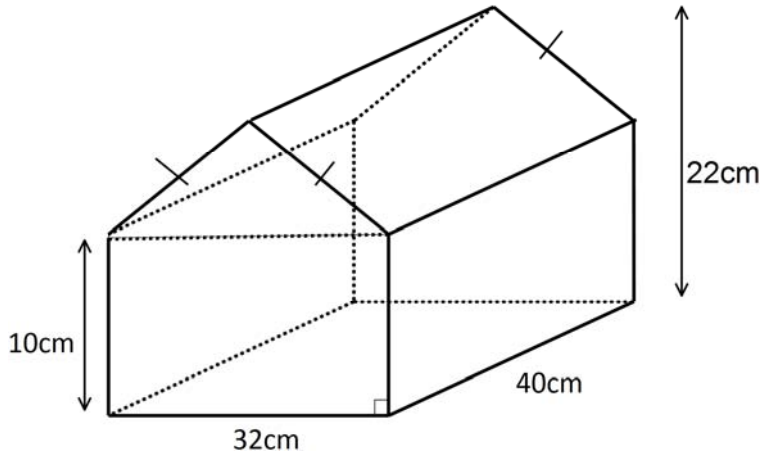
Taxable Income	Tax payable
$1-$6000	Nil
$6001-$20 000	17 cents for each $1 over $6000
$20 001-$50 000	$2380 + 30 cents for each $1 over $20 000
$50 001 - $60 000	$11 380 + 42 cents for each $1 over $50 000
$60 001 and over	$15 580 + 47 cents for each $1 over $60 000

Using the table provided calculate:

i) the tax paid on an income of $12 500.

ii) the taxable income if a person paid $14131 in tax.

c) Find the volume of the following prism. *3*



d) A cylindrical water tank of 4 metres in diameter, has a capacity of 50 000 litres. *2*
How deep is the water when the tank has been emptied by 30%? Answer to the nearest metre.

e) Anita wants to invest $5000 long enough for it to grow to at least $10 000. The compound interest rate is 6% p.a. If interest is compounded yearly, how many whole number years does she need to invest the money for so that she reaches her target? *2*

f) An apprentice mechanic agrees to be paid $90 for each day that he comes to work and to pay his employer $40 for each day that he does not come to work. Form an equation to find, how many days the apprentice worked in April if his total pay for the month was $1790? *2*

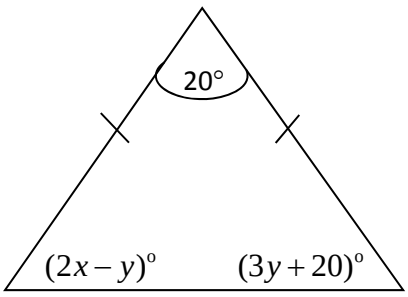
Question 5

a) Write $\sqrt{3\sqrt{3\sqrt{3}}}$ in index form. *2*

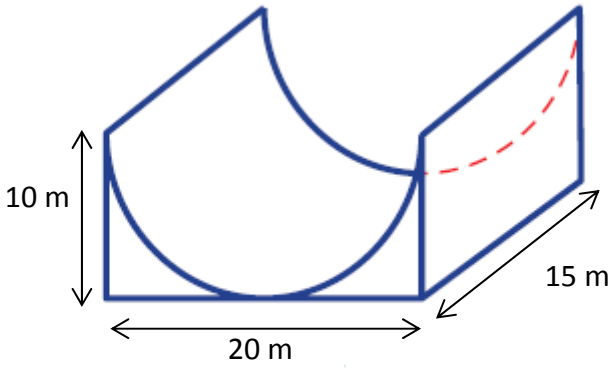
b) Simplify $\dfrac{(u^{-2})^{-3}\times(u^{5})^{-1}}{u^{-3}\times u^{5}}$. Express the answer without negative indices. *3*

c) A leather handbag was discounted by $\$x$ and then sold for $\$y$. Find the percentage discount in terms of x and y. *2*

d) An isosceles triangle is shown below. Using geometric properties form a pair of simultaneous equations to solve for x and y. *3*



e) A half pipe for the use of skateboarders is to be built at the local park on a concrete slab. Calculate the surface area of a construction, including the sides and base, with the given dimensions. Answer to the nearest square metre. *4*



-- End of task –

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2015 YR9 Half Yearly.

Q1

a) i) 7.49×10^{-5} ✓

ii) 2.8×10^{8} ✓

b) 2240000

c) i) $2\sqrt{24} = 2\sqrt{4\times6}$ ✓

$= 4\sqrt{6}$ ✓

ii) $8\sqrt{5} - 2\sqrt{4\times5}$ ✓

$8\sqrt{5} - 4\sqrt{5} = 4\sqrt{5}$ ✓

iii) $\frac{8a^5}{66a^0} = \frac{4a^5}{33}$ ✓✓

d) $d = 8$ cm

$P = \frac{\pi d}{2} + 8$ ✓

$= \frac{\pi \times 8}{2} + 8$

$= 4\pi + 8$ cm ✓

e)

$I = \frac{160 \times 11 \times 9}{100}$ ✓

$= 158.40$ ✓

2 a) $\$1927.50 \times 52 \times 0.025 = \$1725.75$

Many people forgot to multiply by 52.

b) $\$2400 \times (1-0.17)^2 - \$2400 \times (1-0.17)^3 = \$281.0712$

$\doteq \$281.07$

The question did not ask for the total depreciation over 3 years.

c) $A = \frac{1}{2} \times (10.4 - 3.7) \times (8.1 - 3.7) + 3.7 \times 8.1$

$= 44.71 m^2$

d) i) $8 - 3m < -4$

$-3m < -12$

$m > 4$

Many forgot to reverse the inequality symbol

ii) $\frac{x-2}{5} = 3$

$x - 2 = 15$

$x = 17$

e) i) $l = 3.25 \times 12$ $\quad w = 3.25 \times 6$

$= 39 cm$ $\quad = 19.5 cm$

ii) $A = 39 \times 19.5 - \pi \times 3.25 \times 8$

$= 163.204696$

$\doteq 163 cm^2$

Year 9 Half Yearly
Question 3

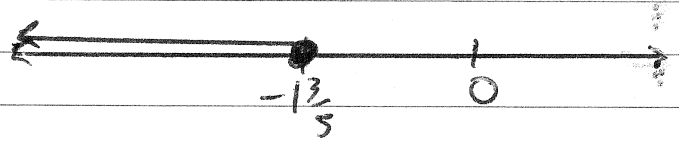
(a) $\frac{20a^7}{10a^5} = 2a^2$

(b) $\frac{y}{2} - 3y \geq 4$

$y - 6y \geq 8$

$-5y \geq 8$

$y \leq -\frac{8}{5} = -1\frac{3}{5}$



Many students had trouble simplifying "$\frac{y}{2} - 3y$"

(c) $18\pi = \frac{2}{3}\pi r^3$

$\frac{3}{2} \times 18 = r^3$

$r^3 = 27$

$r = 3$ cm

Students did not divide the π from both sides.

(d) (i) $20 - 4(x-2) + 5x = 20 - 4x + 8 + 5x$
$= x + 28$

(ii) $(7+\sqrt{3})(7-\sqrt{3}) = 7^2 - \sqrt{3}^2$
$= 49 - 3$
$= 46$

(iii) $(2x-1)(x+5) = 2x^2 + 10x - x - 5$

$= 2x^2 + 9x - 5$

(e) $2x-y=6 \Rightarrow y=2x-6$ (A)

$3x+4y=-46$ (B)

Sub (A) into (B).

$3x+4(2x-6)=-46$

$3x+8x-24+46=0$

$11x+22=0$

$x=-2$.

Sub into (A)

$y=2(-2)-6$

$y=-10$

$x=-2, \ y=-10$.

Question 4:

a) $2s = v^2 - u^2$

(2) $u^2 = v^2 - 2s$ ✓

$\therefore u = \pm\sqrt{v^2 - 2s}$ ✓

✱ Most students could not solve this question.

b) i) Tax paid $= 0.17 \times (12500 - 6000)$

(3) $= 0.17 \times 6500$

$= \$1105$ ✓

ii) $\$14131 = \$11380 + 0.42x(x - 50000)$

$2751 = 0.42(x - 50000)$ ✓

$6550 = x - 50000$

$\therefore x = \$56550$ ✓

c) $V = Ah$

(3) $= \left(10 \times 32 + \frac{1}{2} \times 32 \times 12\right) \times 40$ ✓✓

$= (320 + 192) \times 40$

$= 20480\ cm^3$. ✓

✱ Many calculator errors were made.

d) $V = Ah$

(2) $50 = \pi \times 2^2 \times h$

$h = 3.97887\ldots\ m$ ✓

$1000L = 1m^3$

$50000L = 50m^3$

But tank has been emptied by 30%

$\therefore$ height of water $= 0.7 \times h$

$\doteq 2.785\ldots\ m$

$\doteq 3m$ (nearest metre) ✓

✱ Conversion of units needed greater care here.

Q4 e) $10000 = 5000(1+0.06)^n$ ✓

(2) $2 = 1.06^n$

guess + check:

when $n=10$: $1.06^{10} \doteq 1.791$

$n=11$: $1.06^{11} \doteq 1.898$

$n=12$: $1.06^{12} = 2.012$

$\therefore$ $n = 12$ years. ✓

f) Paid \$90 on a working day.

(2) Pays employer \$40 when sick.

April = 30 days.

$w + s = 30$.

$s = 30 - w$ ---①

$\$90w - \$40s = 1790$

$90w - 40(30-w) = 1790$. ✓

$90w - 1200 + 40w = 1790$

$130w - 1200 = 1790$.

$130w = 2990$ ✓

$w = 23$ days at work

check $23 \times 90 - 7 \times 40 = \$1790$

Yr 9

5)

a) $\sqrt{3\sqrt{3 \times 3^{\frac{1}{2}}}}$

$\sqrt{3(3.3^{\frac{1}{3}})^{\frac{1}{2}}}$

$\left(3.\left(3^{1}.3^{\frac{1}{3}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}$

$3^{\frac{1}{2}}.3^{\frac{1}{4}}.3^{\frac{1}{8}}$

$3^{\frac{7}{8}}$

* Many students couldn't do this question

b) $\frac{u^{6} \cdot u^{-5}}{u^{2}}$

$= \frac{u}{u^{2}}$

$= \frac{1}{u}$

* Many students didn't know the index Laws

c) $(L - x) = y$

$\%dis = \frac{x}{L} \times 100$

$= \frac{x}{y+x} \times 100$

$= \frac{100x}{y+x}$ ✓✓

* This question was done poorly.

d) $2x - y = 3y + 20$

$2x - y + 3y + 20 + 20 = 180$

$2x + 2y = 140$

$x + y = 70$ — ①

$2x - 4y = 20$

$x - 2y = 10$ — ②

① − ②

$3y = 60$ ✓✓

$y = 20$ ✓

$\therefore x = 50$

* This question was done poorly

e)

$SA = \frac{1}{2} \times 2\pi \times 10 \times 15 +$

$15 \times 10 \times 2 + 20 \times 15 +$

$2 \times (20 \times 10 - \frac{1}{2}\pi \times 100)$

$= 150\pi + 300 + 300 + 200$

$- (50\pi \times 2)$

$= 1000 + 50\pi$ ✓✓

$= 1157$ ✓

* Many students had poor setting out