Sydney Girls High School

Mathematics

Year 9 Assessment Task 2
2015

Time Allowed: 60 minutes + 5 minutes reading time

Topics: 25%: Computation & financial mathematics; Expressions, equations & inequalities; Length, area, surface area & volume; Indices & surds
75%: Right-angled triangles (excluding bearings); Linear relationships; Properties of geometrical figures; Quadratic expressions & algebraic fractions; Probability & single variable data analysis

Total: 60 marks

Instructions:

- There are FOUR (4) Questions of equal value.
- Attempt all questions.
- Full marks may not be awarded for careless or incomplete setting out.
- Start each Question on a new page.
- Write on one side of the paper only.
- Diagrams are NOT drawn to scale.
- Board-approved calculators may be used.

Student's Name: _____ Teacher's Name: _____

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QUESTION 1 (15 Marks)

MARKS

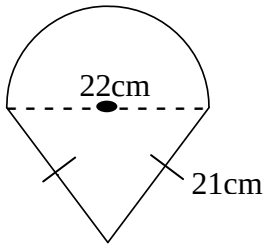
a) Evaluate and write the following in scientific notation, correct to 2 significant figures: 2

$$\frac{3\pi \times \sqrt{41.87}}{785.7^{-9}}$$

b) Amy bought a digital SLR camera for $1250. What would be the value of the camera after 4 years if it depreciates at a rate of 15% p.a.? 2

c) A water tank holds 300 litres more than another tank. If the smaller tank is two-thirds full, it holds as much as the larger tank when it is half full. What is the capacity of the larger tank? 3

d) Find the exact perimeter of the following shape: 2



e) Find the volume of a cylinder with radius 5.4m and height 3.6m, to 1 decimal place. 2

f) Simplify the following: 2

$$\frac{6\sqrt{2} \times \sqrt{5}}{3\sqrt{20}}$$

g) Find the value of x in the following equation: 2

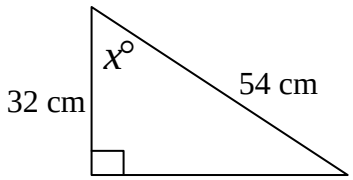
$$4^x = \frac{1}{64}$$

QUESTION 2 (15 Marks) Start a new page

MARKS

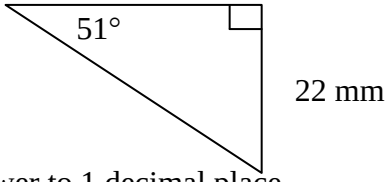
a) Find the value of the pronumeral in each of the following figures: 4

(i)



Answer to the nearest minute.

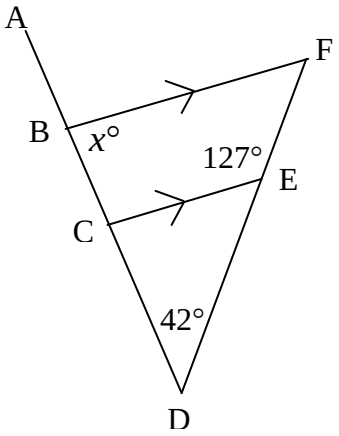
(ii) y mm



Answer to 1 decimal place.

b) The midpoint of AB is (-6,2). If A is the point (4,4), what are the coordinates of B? 2

c) Find the value of x in the diagram, giving reasons. 3



d) Sketch the line $2x + y = 5$ 2

e) A company makes a particular mobile phone and tests the phone regularly to see if it will survive the product warranty period. In a test of 1000 phones, it finds 89 are faulty in some way. Based on this evidence, if they sell 50 000 mobile phones, how many will they expect to fail during the warranty period? 2

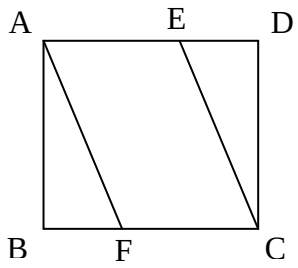
f) Factorise $3x^2 - 11x + 6$ 2

QUESTION 3 (15 Marks) Start a new page

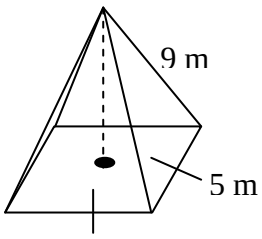
MARKS

a) The points X(2,2), Y(-2,4) and Z(-4,0) form a triangle. Show that the triangle is both isosceles and right-angled. 3

b) ABCD is a square. $\angle AFB = \angle CED$. Prove that $\Delta ABF \equiv \Delta CDE$, and hence prove that $BF = DE$. 4



c) Find the height of the following square-based pyramid, correct to 2 decimal places. 3



d) Simplify fully $\dfrac{2}{y^2+5y-6} - \dfrac{3}{2y^2-2y}$ 3

e) A number is chosen from the set of positive integers between 1 and 20 inclusive. If A is the set of even numbers and B is the set of multiples of 4 less than 20, find $P(A \cup B)$. 2

QUESTION 4 (15 Marks) Start a new page

MARKS

a) The ages of employees in a particular store are shown in the stem-and-leaf plot below. 5

Stem	Leaf
1	7 8 9 9
2	0 0 0 0 0 0 1 1 1 1 2 2 3 3 3 4

Key: 1/7 means 17

Using the data provided:

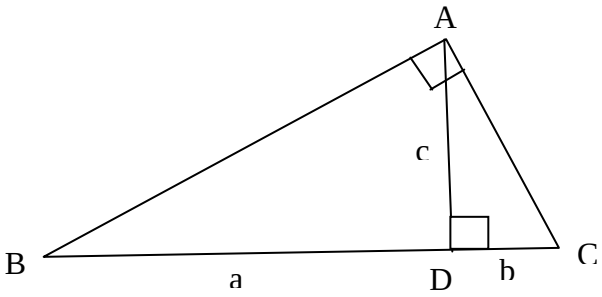
(i) Find the range of ages
(ii) Find the median age
(iii) Find the interquartile range
(iv) Construct a box plot to represent the data.

b) A line is drawn perpendicular to the line $2x-3y+4=0$ and passes through the point $(-1,2)$. What is the equation of the line? 3

c) A plane is flying at an altitude of 1400m. From a point P on the ground, the angle of elevation to the plane was $72°41'$ and 40 seconds later the angle of elevation from P had changed to $21°57'$. How far had the plane flown in that 40 seconds, to the nearest metre? 3

d) $\angle BAC = 90°$ and $AD \perp BC$. $BD = a$, $CD = b$ and $AD = c$. 4

Prove that $ab = c^2$.



END OF TEST

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Year 9 Assessment 2 – 2015

Question 1

(a) 7.0×10^{27}

(b) $A = P(1-R)^n$
$= 1250(1-0.15)^4$
$\doteq \$652.51$

(c) Let smaller tank $= x$
$\therefore$ Larger tank $= (x+300)$

$\frac{1}{2}(300+x) = \frac{2}{3}x$

$900 + 3x = 4x$

$x = 900$

$\therefore$ Larger tank $= 900+300$
capacity $= 1200\,L$

(d) $P = \frac{1}{2} \times 2\pi r + 21 \times 2$
$= (11\pi + 42)$ cm

(e) $V = \pi r^2 h$
$= \pi \times 5.4^2 \times 3.6$
$\doteq 329.8\ m^3$ (to 1 d.p.)

(f) $\frac{6\sqrt{2} \times \sqrt{5}}{3\sqrt{20}} = \frac{6\sqrt{2} \times \sqrt{5}}{3 \times 2\sqrt{5}}$

$= \sqrt{2}$

(g) $4^x = \frac{1}{64}$

$4^x = \frac{1}{4^3}$

$4^x = 4^{-3}$

$\therefore x = -3$

Question 2 (15 Marks)

a) i) $\cos x = \frac{32}{54}$

$x = 53°40'$ (nearest minute) (2)

ii) $\tan 51° = \frac{22}{y}$

$y = \frac{22}{\tan 51°} \doteq 17.8\text{mm}$ (2)

Rounding for this needs improvement

b) Let the midpoint = $B(x, y) = (-16, 0)$.

$\therefore \frac{x+4}{2} = -6$ and $\frac{y+4}{2} = 2$

$x = -16$ $\quad y = 0$ (2)

c) $\angle FBC = \angle ECD = x°$ (corresponding $\angle$s, $BF \parallel CE$)

$\angle CED = 180° - \angle FEC$ (straight $\angle$)

$= 180° - 127°$

$= 53°$

$\therefore x + 53 + 42 = 180°$ ($\angle$ sum of $\triangle CED$)

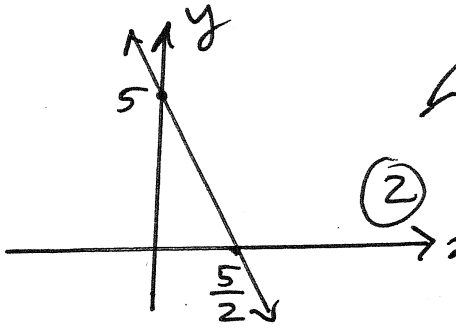
$x = 85°$ (3)

Parallel lines needed to be included in reasons

d) $2x + y = 5$

when $x = 0$ $y = 5$

when $y = 0$ $x = \frac{5}{2}$



(2)

Intercepts needed to be shown clearly. Students should label the x-y axes.

e) $50000 \times \frac{89}{1000} = 4450$ faulty phones (2)

f) $3x^2 - 11x + 6$

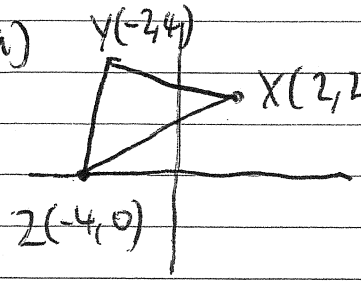
$= 3x^2 - 9x - 2x + 6$

$= 3x(x-3) - 2(x-3)$

$= (3x-2)(x-3)$ (2)

Question 3.

(a)



$XY^2 = (2-2)^2 + (2-4)^2$

$= 20$

$XY = 2\sqrt{5}$

$YZ^2 = (-4--2)^2 + (0-4)^2$

$= 20$

$YZ = 2\sqrt{5}$

Many students ploted the points and draw the triangle but didn't answer the question.

So $XY = YZ$ therefore

ΔXYZ is isosceles.

METHOD 1

$m_{XY} = \frac{2-4}{2--2}$

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

$m_{YZ} = \frac{0-4}{-4--2}$

$= 2.$

$m_{XY} \times m_{YZ} = -\frac{1}{2} \times 2$

$= -1$

$\therefore XY \perp YZ$

METHOD 2

$XZ^2 = (-4-2)^2 + (0-2)^2$

$= 40$

$XZ = 2\sqrt{10}$

If $XZ^2 = XY^2 + YZ^2$

then ΔXYZ is right angled.

$XY^2 + YZ^2 = 20 + 20$

$= 40$

$= XZ^2$

$\therefore XY \perp YZ$

(b) $\angle AFB = \angle CED$ (given)

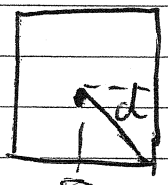
$\angle ABF = \angle EDC = 90°$ ($\angle$s in a square)

$AB = CD$ (sides of a square).

$\therefore \triangle ABF \equiv \triangle CDE$ (AAS)

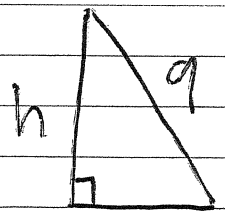
$\therefore BF = DE$ (matching sides of congruent $\triangle$s)

(c)



$d^2 = 2.5^2 + 2.5^2$

$d^2 = \frac{25}{2}$



$9^2 = h^2 + d^2$

$h^2 = 9^2 - d^2$

$h^2 = 81 - \frac{25}{2}$

$h = \sqrt{\frac{137}{2}}$

$h \approx 8.28$ m

Many students interperepted the 9m as the slant height. Where as the 9m was the distance from the apex to the corner of the square.

(d) $\dfrac{2}{(y+6)(y-1)} - \dfrac{3}{2y(y-1)}$

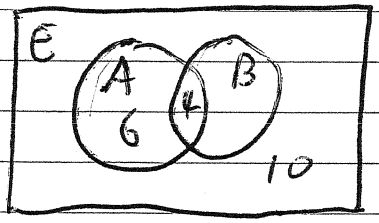
$= \dfrac{4y - 3(y+6)}{2y(y+6)(y-1)}$

$= \dfrac{y-18}{2y(y+6)(y-1)}$

Many student should revise algebraic fractions because they are difficult and not going away.

(e) $A = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$

$B = \{4, 8, 12, 16\}$



$P(A \cup B) = \dfrac{n(A \cup B)}{n(E)}$

$= \dfrac{10}{20}$

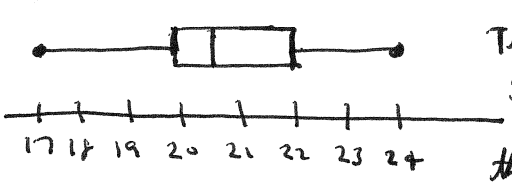
$= \dfrac{1}{2}$.

4 a) (i) $24-17=7$ $24-17$ and $20-32$ is not sufficient

(ii) $\frac{20+21}{2}=20.5$

(iii) $22-20=2$

(iv)



The axis goes under neither the box plot.

b) $2x+4=3y$

$y=\frac{2x+4}{3}$

$m_1=\frac{2}{3}$ perpendicular lines $m_1 \times m_2=-1$

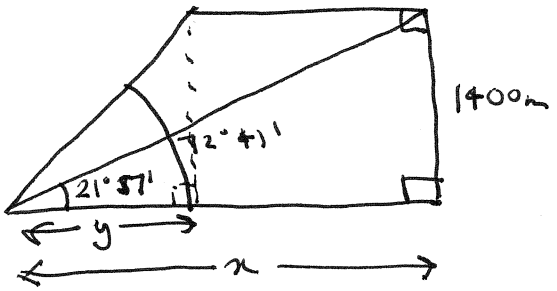
$m_2=-\frac{3}{2}$

$y-2=-\frac{3}{2}(x--1)$

$2y-4=-3x-3$

$3x+2y-1=0$

c)



$\tan 21°57' = \frac{1400}{x}$

$x=\frac{1400}{\tan 21°57'}$

$\tan 72°41' = \frac{1400}{y}$

$y=\frac{1400}{\tan 72°41'}$

$x-y=1400\left(\frac{1}{\tan 21°57'}-\frac{1}{\tan 72°41'}\right)$

$=3037.3487$

$\doteq 3037$ m

d) $(a+b)^2=AB^2+AC^2$

$a^2+2ab+b^2=a^2+c^2+c^2+b^2$

$2ab=2c^2$

$ab=c^2$

This is not a similar triangles question.

Pythagoras theorem was all that was needed.