Sydney Girls High School

Mathematics Department

Year 9 Common task 2

2016

All Topics

Reading Time: 5 minutes

Writing Time: 60 minutes

Instructions:

- There are Four (4) Questions which are of equal value.
- Attempt all questions.
- Show all necessary working. Marks may be deducted for badly arranged work or incomplete working.
- Start each Question on a new page.
- Write on one side of the paper only.
- Diagrams are NOT to scale.
- Board-approved calculators may be used.

TOTAL MARKS: 60

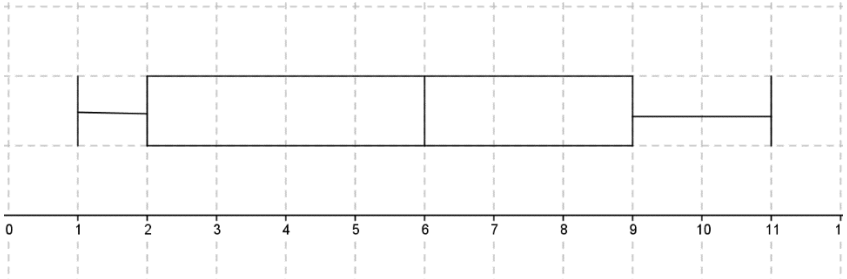
Question 1 (start a new page)

Marks

a) Divide \$50 into the ratio of 2:3. 1

b) Increase 45 by 40 %. 1

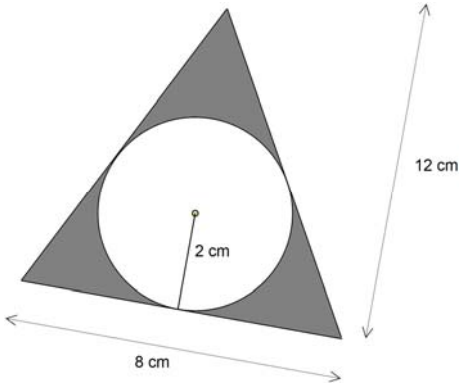
c) Find the interquartile range for the given diagram 1



d) Expand $-2(a-2)$. 1

e) Solve $\frac{8-5t}{3}=2$. 2

f) Find the shaded area. 2



g) Expand and simplify $\left(\sqrt{2}+\sqrt{3}\right)^2$. 2

h) Solve $-2-3x \geq \frac{5x}{2}$. 3

i) A coin is tossed 2 times.

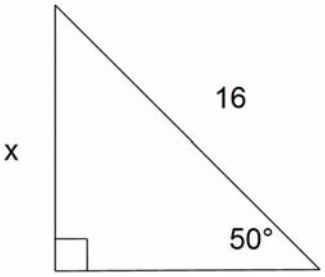
(i) Draw a tree diagram to represent the possible outcomes. 1

(ii) Find the probability of obtaining at least one tail. 1

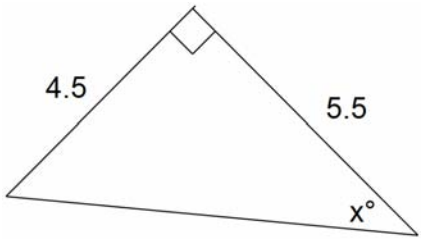
Question 2 (start a new page)

Marks

a) Find the value of x correct to two decimal places. 2

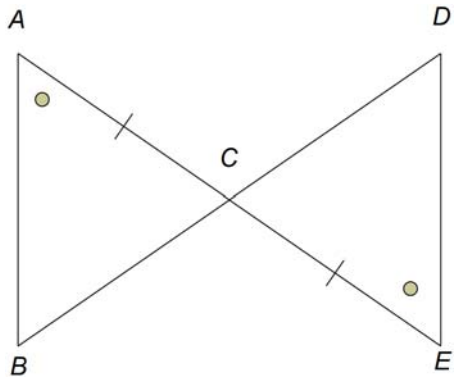


b) Find the value of x correct to the nearest minute. 2



c) Find the midpoint of the interval joining $(2,8)$ and $(6,4)$. 2

d) i) Prove that $\Delta ACB \equiv \Delta ECD$. Give reason for your answers. 2



ii) Hence, show that C is the midpoint of BD. 1

e) Simplify $\frac{2}{3x}-\frac{6}{x-1}$. 2

f) Calculate the exterior angle of a regular polygon given it has an interior angle sum of $5040°$. 2

g) Solve $\frac{x}{4}=\frac{25}{x}$. 2

Question 3 (start a new page)

Marks

a) Draw a diagram to represent the bearing of *O* from *B* is $310°$. 1

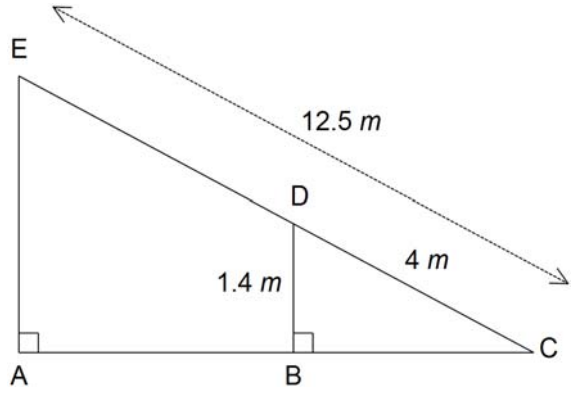
b) Find the length of the segment joining $(3,1)$ and $(-2,7)$ in exact form. 2

c) Expand and simplify $(x+3)(3x-2)$. 2

d) Plot the parabola with equation $y = x^2 + x - 6$ showing the vertex and all intercepts. 3

e) Simplify $\frac{3}{x^2-9} \div \frac{15}{2x+6}$. 3

f) Consider the given diagram.



i) Prove that $\Delta BCD|||\Delta ACE$. 3

ii) Find the length of *AE*. 1

Question 4 (start a new page)

Marks

a) Find the equation of the line perpendicular to $y = 2x - 1$ passing through the point $(0, -1)$. 2

b) Factorize $3x^2 + 2x - 8$. 2

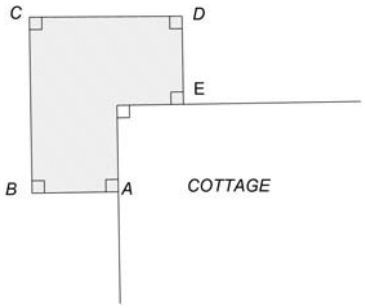
c) Solve for x in terms of a and b: $\dfrac{a}{b} + \dfrac{a}{a-x} = 1$ 3

d) The diagram shows a plan for a deck which is to be built on the corner of a cottage. A railing is to be constructed around the four outer edges of the deck such that $AB = DE = x$ and $BC = CD = y$. The length of the railing is 30 metres.

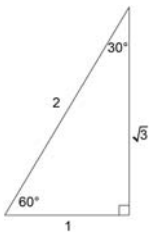
i) Find an expression for y in terms of x. 1

ii) Write a quadratic expression in terms of x and y to represent the shaded area. 2

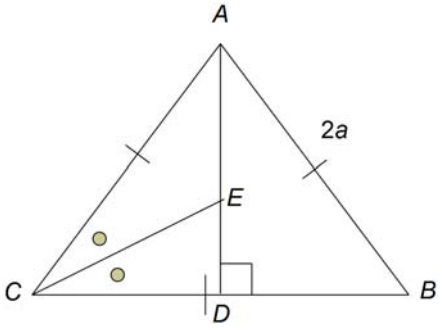
iii) By considering the graph of the relationship in ii), find the maximum area. 2



e) i) Use the given diagram to find the exact value of $\tan 30°$ 1



ii) In the diagram below ΔABC is equilateral and $\angle ACE = \angle ECD$. Hence, find the ratio $AE : ED$ in simplest form. 2



End of task

Yr 9 Task 3

Q1

a) 20 and 30

b) $1.4 \times 45 = 63$

c) $9 - 2 = 7$

d) $-2a + 4$

e) $8 - 5t = 6$

$-5t = -2$

$t = \frac{2}{5}$

f) $\frac{1}{2} \times 12 \times 8 - \pi \times 2^2$

$= 48 - 4\pi$ or $35.4336..$

g) $2 + 3 + 2\sqrt{6}$

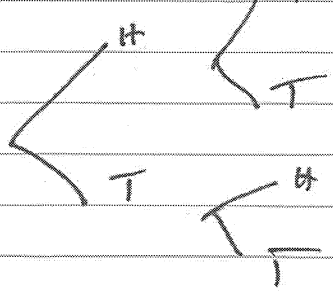
$= 5 + 2\sqrt{6}$

h) $-4 - 6x \geq 5x$

$-4 \geq 11x$

$x \leq \frac{-4}{11}$

i)



ii) $1 - P(HH)$

$1 - \frac{1}{4} = \frac{3}{4}$

Year 8 common Task 2 (2016) Year 10

Q.2. Question 2

a) $\sin 50^\circ = \frac{x}{16}$

$x = 16 \sin 50^\circ = 12.26$

Most of students found it easy and got the full credit.

b) $\tan x^\circ = \frac{4.5}{5.5} = 39^\circ 17'$

Some students did not approximate it to the nearest minute and some did not give the answer in minutes and degrees.

c. $\left(\frac{2+6}{2}, \frac{8+4}{2}\right)$ $(4, 6)$

Majority of students got it right.

d) i) $\triangle ACB$ and $\triangle ECD$

$\angle A = \angle E$ given

$\angle BCA = \angle DCE$ vert. opposite angles.

$AC = CE$ given

So $\triangle ACB \equiv \triangle ECD$ (AAS)

(ii) $BC = CD$ matching sides of congruent $\triangle$s.

$\Rightarrow$ C is the mid point of BD

Some students were confused in providing the correct reasoning, some have given C as the mid point of AE, which was given in the question.

e) $\frac{2}{3x} - \frac{6}{x-1} = \frac{2x-2-18x}{3x(x-1)} = \frac{-16x-2}{3x(x-1)}$

Some students equated the given expression to zero and have solved it instead of simplifying it

f. Sum of exterior angle $= (n-2)180^\circ$

$5040 = (n-2)180^\circ$ n-sides of polygon

$n - 2 = 28$

$n = 30$

Sum of exterior angle $= 360^\circ$

as it is a regular polygon

So exterior angle $= \frac{360}{n} = 12^\circ$

continued →

Question 2 Year 9 common Task 2 (2016) Yearly

continued from the previous page.

Some students have assumed that sum of interior angle and exterior angle is 360°, which is incorrect.

Q.2g

$$\frac{x}{4} = \frac{25}{x}$$

$$x^2 = 100 \longrightarrow x = \pm 10$$

$$x^2 - 100 = 0$$

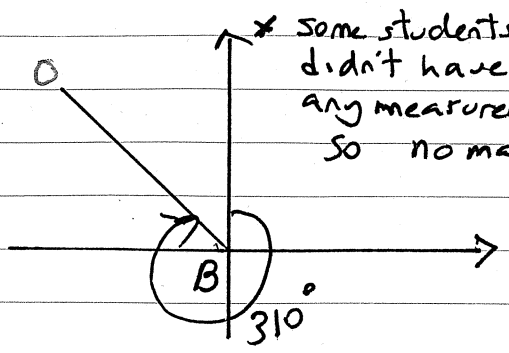
$$(x+10)(x-10) = 0$$

$$x = +10 \text{ or } x = 10$$

Majority of students did not put '$\pm$' sign before 10 which should ~~be used~~ have been used.

Yr 9 2016 Yearly Task

3 a)



* some students didn't have any measurement so no mark. ✓

b) $d = \sqrt{(3+2)^2 + (1-7)^2}$

$= \sqrt{25+36}$ ✓

$= \sqrt{71}$ ✓

c) $(x+3)(3x-2)$

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

$= 3x^2 + 7x - 6$ ✓✓

d)

$x = 0 \longrightarrow y = -6$

$y = 0 \longrightarrow x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3$ or 2 ✓

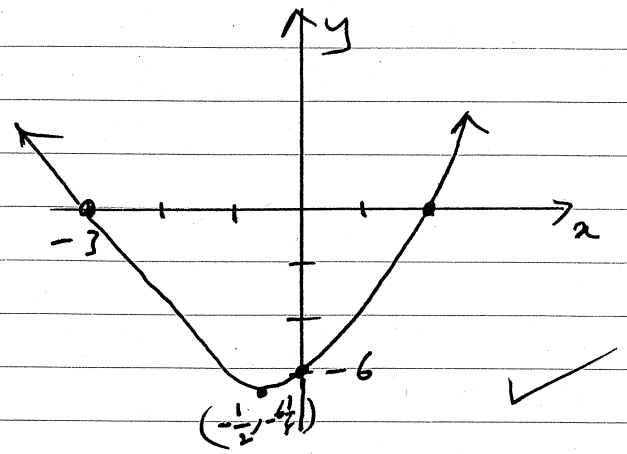
axis of symm. $x = \frac{-1}{2}$

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

$y = \frac{1}{4} - \frac{1}{2} - 6$ ✓

$= -6\frac{1}{4}$

$v\left(-\frac{1}{2}, -6\frac{1}{4}\right)$



✓

* Some students didn't have the correct scale.

e) $\frac{3}{(x-3)(x+5)} \times \frac{2(x+3)}{15}$ ✓

$= \frac{2}{5(x-3)}$ ✓

$= \frac{2}{5x-15}$ ✓

f) i) In Δs BCD & ACE

$\angle B = \angle A = 90$ (given) ✓

$\angle C$ is common ✓

$\therefore$

$\Delta BCD \,|||\, \Delta ACE$ (equiangular) ✓

ii) $\frac{AE}{1.4} = \frac{12.5}{4}$

$4AE = 17.5$ ✓

$AE = 4.375$ m

* some students used the wrong reason.

4 a) $m_1 = 2$

$m_2 = -\frac{1}{2}$ You could use the point slope formula

$(0,-1)$ is the y intercept

$\therefore y = -\frac{1}{2}x - 1$

b) $3x^2 + 6x + 4x - 8$

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

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

c) $a(a-x) + ab = b(a-x)$

$a^2 - ax + ab = ab - bx$

$bx - ax = ab - a^2$

$x(b-a) = \frac{-a^2}{b-a}$

$= \frac{a^2}{a-b}$

d) i) $2y + 2x = 30$

$2y = 30 - 2x$ y must be the subject

$y = 15 - x$

ii) $y^2 - (y-x)^2$

$= y^2 - y^2 + 2xy - x^2$

$= 2xy - x^2$ Many people stopped here.

$= 2x(15-x) - x^2$

$= 30x - 2x^2 - x^2$

$= 30x - 3x^2$

iii) $A = 30x - 3x^2$

Let $A = 0$

$3x(10 - x) = 0$

$x = 0, \quad x = 10$

mean A when $x = \frac{0+10}{2}$

$= 5$

$\therefore A = 30 \times 5 - 3 \times 5^2$

$= 75 m^2$

e) i) $\tan 30° = \frac{1}{\sqrt{3}}$

ii) $\tan 60° = \frac{AD}{a}$

$\sqrt{3} = \frac{AD}{a}$

$AD = \sqrt{3}a$

$\tan 30° = \frac{DE}{a}$

$\frac{1}{\sqrt{3}} = \frac{DE}{a}$

$DE = \frac{a}{\sqrt{3}}$

$AE = \sqrt{3}a - \frac{a}{\sqrt{3}}$

$= \frac{3a - a}{\sqrt{3}}$

$= \frac{2a}{\sqrt{3}}$

$\therefore AE : ED$

$= \frac{2a}{\sqrt{3}} : \frac{a}{\sqrt{3}}$

$= 2 : 1$

The correct answer with no working was given 0 marks.