SYDNEY GRAMMAR SCHOOL

NAME _____ MATHS MASTER _____

2024 **Half-Yearly Examination**

Form III Mathematics

Tuesday 28th May, 2024
Session A

General Instructions

- Working time — 1 hour 30 minutes
- Attempt all questions.
- Write using black pen.
- Calculators approved by NESA may be used.

Eight Questions — 104 Marks

- Each question is worth 13 marks.
- Relevant mathematical reasoning and calculations are required.
- Record your answers on the writing paper provided.
- Start each question on a new page.

Collection

- Write your name and master on this page and on each page of writing paper.
- Arrange your solutions in order.
- Staple the sheets of writing paper together.

Classes

3A: LRP/AHSH	3B: WJW	3C: YH	3D: NWS/PJE	3E: RCF/BR
3F: YIS/WTT	3G: OMD	3H: NJL	3I: BLR	3J: RR

Checklist

- 14 sheets of writing paper per boy
- Candidature: 198 pupils

Writer: WJW

QUESTION ONE (13 marks) Start a new page.

(a) Simplify:

(i) $5x - 2x$ **1**

(ii) $10y + 6 - 10y - 2$ **1**

(b) Expand:

(i) $2(x + 3)$ **1**

(ii) $-4(x - 5)$ **1**

(c) Evaluate $4a + 3b$ when $a = -2$ and $b = 4$. **1**

(d) Factorise:

(i) $3x - 6$ **1**

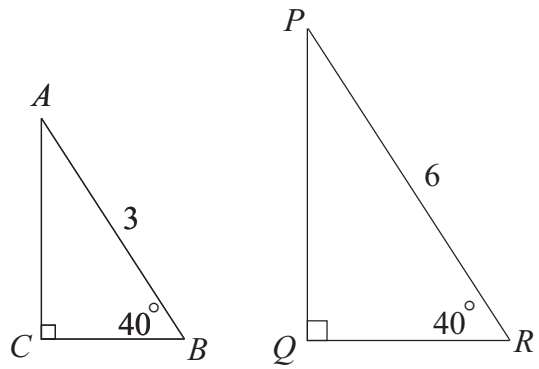
(ii) $6p^2 + 12p$ **1**

(e) Solve the following equations:

(i) $\frac{x}{5} = 3$ **1**

(ii) $4x + 9 = x$ **1**

(f) **1**



Which similarity test would be used to show $\triangle ABC$ is similar to $\triangle PRQ$?

(g) Simplify:

(i) $(a^2)^3$ **1**

(ii) $3a^7 \times 5a^{-3}$ **1**

(h) On any given day, the probability that Bill gets wet on his walk to school is $\frac{2}{5}$. What is the probability that he stays dry? **1**

QUESTION TWO (13 marks) Start a new page.

(a) State the number of significant figures in each measurement.

(i) 20.4 kg **1**

(ii) 0.006 606 seconds **1**

(b) Simplify the following, showing clear working.

(i) $\sqrt{24}$ **1**

(ii) $\sqrt{45} - 2\sqrt{5}$ **1**

(iii) $\sqrt{3}\left(2\sqrt{3} + 1\right)$ **1**

(c) A six-sided die is thrown and the uppermost number is noted. Find the probability that the number is even. **1**

(d) Express the following with positive indices.

(i) x^{-5} **1**

(ii) $(3t)^{-2}$ **1**

(e) Convert each of the following into scientific notation.

(i) 0.000 045 6 **1**

(ii) 1 140 000 **1**

(f) The circumference of a circle with radius r is given by the formula $C = 2\pi r$. Express the formula with r as the subject. **1**

(g) Express the following using fractional indices.

(i) $\sqrt{14}$ **1**

(ii) $\sqrt[5]{a^2}$ **1**

The paper continues on the next page

QUESTION THREE (13 marks) Start a new page.

(a) Rationalise the denominator and simplify, showing clear working:

(i) $\dfrac{1}{\sqrt{24}}$ **1**

(ii) $\dfrac{3\sqrt{7}}{\sqrt{3}}$ **1**

(b) Expand and simplify:

(i) $(x-8)(x+8)$ **1**

(ii) $x-1+2(2x+2)$ **2**

(iii) $(5+x)^2$ **1**

(c) Simplify:

(i) $6a^8b^4 \div 3ab^2$ **1**

(ii) $3x^0+(3y)^0+3xy^0$ **2**

(iii) $\dfrac{(a^2b^3)^3}{(a^3b^2)^2}$ **2**

(d) Factorise:

(i) $25n^2-1$ **1**

(ii) $x^2+8x+16$ **1**

QUESTION FOUR (13 marks) Start a new page.

(a) (i) Solve the inequality $6x + 12 \geq 3x - 6$. **1**

(ii) Hence graph the solution on a number line. **1**

(b) Factorise:

(i) $x^2 + 4x + 3$ **1**

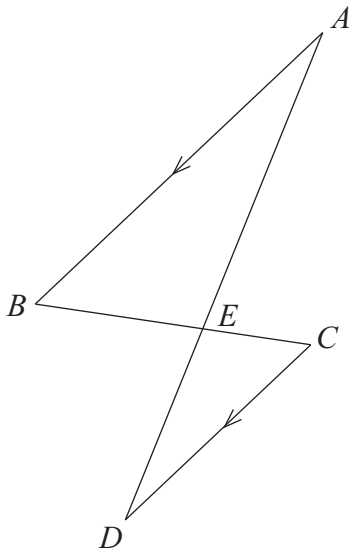
(ii) $x^2 - 2x - 15$ **1**

(c) A triangle has side lengths of 12 cm, 15 cm and 19 cm. Use Pythagoras' theorem to determine whether the triangle is right-angled or not. **1**

(d) Rationalise the denominator of $\dfrac{6}{\sqrt{10} - \sqrt{7}}$, showing clear working. **2**

(e) A map uses a scale of 1 : 50 000. Calculate the actual distance corresponding to a distance of 3 cm measured on the map. Give your answer in kilometres. **2**

(f) **2**



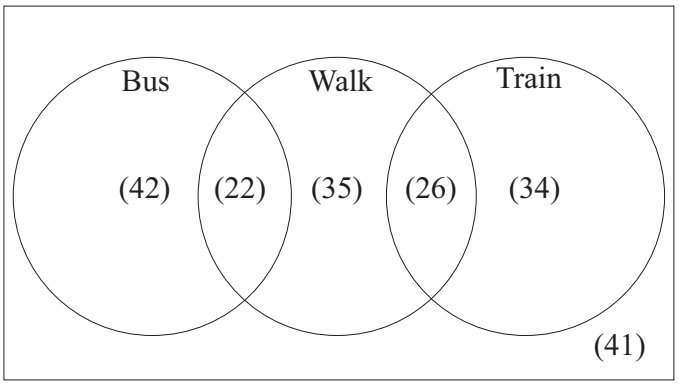
In the diagram above, $AB \parallel CD$. Prove that $\triangle ABE$ is similar to $\triangle DCE$, giving clear geometric reasons.

(g) By using the difference of two squares, show that $998 \times 1002 = 999\,996$. **2**

The paper continues on the next page

QUESTION FIVE (13 marks) Start a new page.

(a)



The Venn diagram above represents the ways in which 200 boys in Form III travel to school. What is the probability that a boy chosen at random from Form III:

(i) travels by bus or train? **1**

(ii) travels by bus and train? **1**

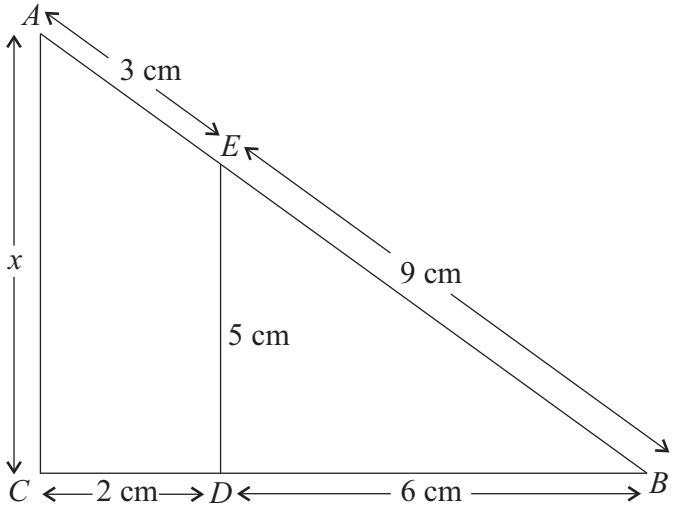
(iii) does not travel by bus or train? **1**

(b) Solve the following equations:

(i) $2-2\,(x-2)=3\,(x-3)$ **2**

(ii) $\dfrac{2x+1}{3}-\dfrac{5x-1}{6}=1$ **2**

(c)



(i) In the diagram above, prove that $\triangle ABC$ is similar to $\triangle EBD$. **2**

(ii) Hence find the value of x, giving a geometrical reason. **2**

(d) Given the formula $S=\dfrac{n}{2}\Big(2a+(n-1)\,d\Big)$, rearrange the formula to make d the subject. **2**

QUESTION SIX (13 marks) Start a new page.

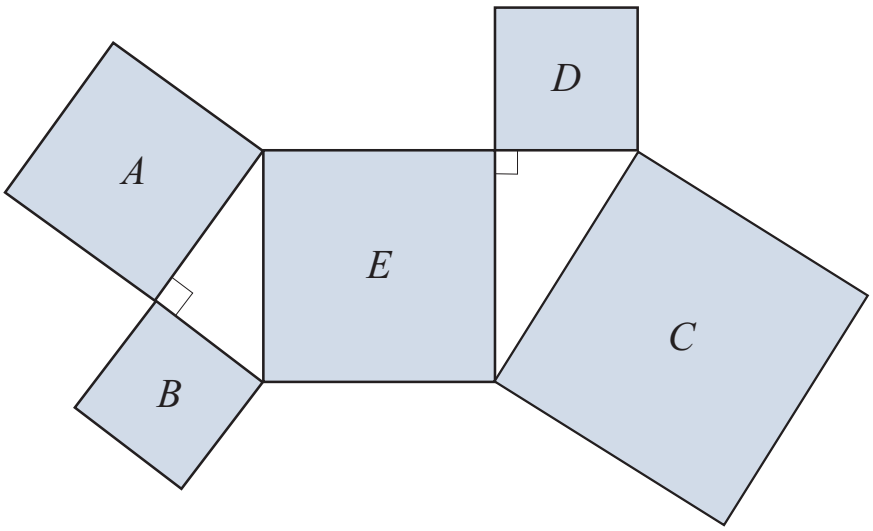
(a) Solve the equation $\dfrac{1}{x^2+5x-6} = \dfrac{2}{2x^2+2x+12}$. **2**

(b) Factorise fully:

(i) $2\left(x+4\right)^2 - 32x$ **2**

(ii) $\left(x^2-6x+7\right)^2 - 4$ **3**

(c) **3**



In the diagram above, there are five squares labelled A, B, C, D and E. The areas of squares A, B and C are $16\,\text{cm}^2$, $8\,\text{cm}^2$ and $60\,\text{cm}^2$ respectively. The arrangement of the squares forms two right-angled triangles. Calculate the side length of square D.

(d) The local ice cream shop offers a special where a customer can choose one or two toppings for their ice cream. The available toppings are chocolate chips, sprinkles, and almonds. Assume each customer is equally likely to choose either one or two toppings, and they are equally likely to choose any combination of toppings when they decide to have more than one.

(i) Draw a tree diagram to represent all possible combinations of toppings a customer might choose. **2**

(ii) Calculate the probability that a customer chooses chocolate chips as one of their toppings. **1**

The paper continues on the next page

QUESTION SEVEN (13 marks) Start a new page.

(a) (i) Simplify $\dfrac{50^{100}}{100^{50}}$, showing clear working. **2**

(ii) Evaluate $\left(\dfrac{4}{5}\right)^{2024} \times (-1.25)^{2025}$, showing clear working. **2**

(b) A boat travels downstream from A to B in 2 hours. On the return journey, the boat travels upstream from B back to A in 2.5 hours. Given that the speed of the river current is 3 km/h, calculate the distance between A and B. **3**

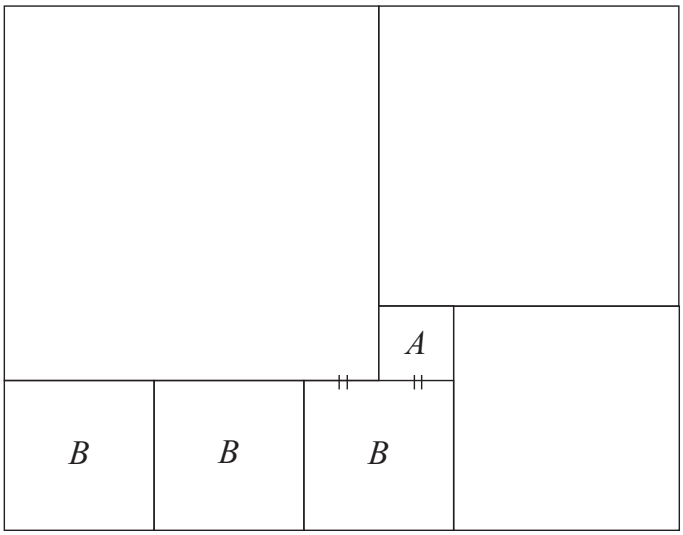
(c) You are participating in a mathematics game with a boy in the class. The game uses four identical cards, each marked with a unique number: $0, 1, -2$, or 3. The cards are shuffled and placed face down. The game is played as follows:

1. One player picks a card at random and records the number.
2. Without replacing the first card, the second player picks another card at random.
3. The numbers on the two cards are compared:
   - If the first number is less than the second number, the first player wins.
   - If the first number is greater than the second number, the second player wins.

(i) Draw an array of all possible outcomes of the game. **2**

(ii) Does the player who picks the card first have an advantage in terms of winning? Justify your answer with calculation. **1**

(d) **3**

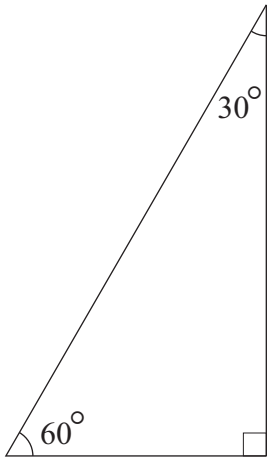


The diagram above shows a large rectangle composed of seven individual squares. The squares labelled B are congruent to each other. The area of square A is $2\,\text{cm}^2$. Calculate the area of the whole rectangle.

QUESTION EIGHT (13 marks) Start a new page.

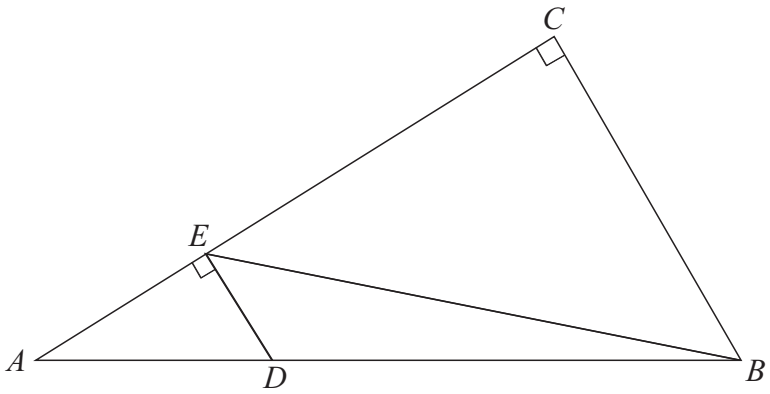
(a) Consider $\triangle ABC$ with sides a, b and c, which satisfy $2a^2 + b^2 + c^2 = 2a\,(b + c)$. What type of triangle is $\triangle ABC$? Support your answer with relevant calculations. **3**

(b) (i) **2**



A 30-60-90 triangle is a right-angled triangle characterised by interior angles of 30°, 60° and 90°. By forming an equilateral triangle, prove that in a 30-60-90 triangle, the hypotenuse is twice as long as the shortest side, and the length of the other side is $\sqrt{3}$ times the shortest side.

(ii) **3**



In the diagram above, $\triangle ABC$ is a right-angled triangle with angle C being the right angle. Point D lies on side AB, such that the ratio of AD to DB is $1 : 2$. $\angle A = 30°$ and DE is perpendicular to AC.

Given that the length of BE is $\sqrt{21}$ cm, determine the length of side BC.

(c) Factorise $(a^2 - 1)\,(b^2 - 1) + 4ab$. **2**

(d) Given that $x + y = -4$ and $xy = 2$, calculate the value of $\sqrt{\dfrac{x}{y}} + \sqrt{\dfrac{y}{x}}$. **3**

END OF PAPER

B L A N K P A G E

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Form III Half-Yearly Examination Solution

Question 1

a) i) $3x$ [1]
ii) 4 [1]

b) i) $2x+6$ [1]
ii) $-4x+20$ [1]

c) $4x-2+3\times4$
$= -8+12$
$= 4$ [1]

d) i) $3(x-2)$ [1]
ii) $6p(p+2)$ [1]

e) i) $x = 15$ [1]
ii) $x = -3$ [1]

f) AAA [1]

g) i) a^6 [1]
ii) $15a^4$ [1]

h) $P(\text{dry}) = \frac{3}{5}$ [1]

Question 2

a) i) 3 [1]
ii) 4 [1]

b) i) $\sqrt{24}$
$= \sqrt{4\times6}$
$= 2\sqrt{6}$ [1]

ii) $\sqrt{45}-2\sqrt{5}$
$= \sqrt{9\times5}-2\sqrt{5}$
$= 3\sqrt{5}-2\sqrt{5}$
$= \sqrt{5}$ [1] Must have working.

iii) $\sqrt{3}(2\sqrt{3}+1)$
$= 2\times3+\sqrt{3}$
$= 6+\sqrt{3}$ [1]

c) $P(\text{even}) = \frac{1}{2}$ [1]

d) i) $\frac{1}{x^5}$ [1]

ii) $\frac{1}{9t^2}$ or $\frac{1}{(3t)^2}$ [1]

e) i) 4.56×10^{-5} [1]
ii) 1.14×10^{6} [1]

f) $r = \frac{C}{2\pi}$ [1]

g) i) $14^{\frac{1}{2}}$ [1]
ii) $a^{\frac{2}{5}}$ [1]

Question 3

a) i) $\frac{1}{\sqrt{24}} \times \frac{\sqrt{24}}{\sqrt{24}}$

$= \frac{\sqrt{24}}{24}$

$= \frac{2\sqrt{6}}{24}$

$= \frac{\sqrt{6}}{12}$ [1] Must have working.

ii) $\frac{3\sqrt{7}}{\sqrt{3}}$

$= \frac{3\sqrt{7} \times \sqrt{3}}{\sqrt{3} \times \sqrt{3}}$

$= \frac{3\sqrt{21}}{3}$

$= \sqrt{21}$ [1] Must have working.

b) i) $x^2 - 64$ [1]

ii) $x - 1 + 4x + 4$ [1]

$= 5x + 3$ [1]

iii) $(5+x)^2$

$= 25 + 10x + x^2$ [1]

c) i) $2a^7b^2$ [1]

ii) $3x + 1 + 3x$ [1]

$= 4 + 3x$ [1]

iii) $\frac{a^6b^9}{a^6b^4}$ [1]

$= b^5$ [1]

d) i) $(5n+1)(5n-1)$ [1]

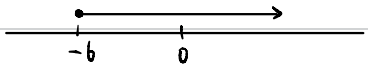
ii) $(x+4)^2$ [1]

Question 4

a) i) $3x \geq -18$

$x \geq -6$ [1]

ii)



[1]

b) i) $(x+1)(x+3)$ [1]

ii) $(x+3)(x-5)$ [1]

c) $12^2 + 15^2 = 369$

$19^2 = 361$ [1]

$369 \neq 361$ $\therefore$ It is not a right-angled triangle.

d) $\frac{6}{\sqrt{10} - \sqrt{7}}$

$= \frac{6(\sqrt{10} + \sqrt{7})}{(\sqrt{10} - \sqrt{7})(\sqrt{10} + \sqrt{7})}$ [1]

$= \frac{6(\sqrt{10} + \sqrt{7})}{3}$

$= 2(\sqrt{10} + \sqrt{7})$ [1]

e) i) $1 : 50\,000$

$3 \times 50\,000$

$= 150\,000$ cm [1] working

$= 1500$ m

$= 1.5$ km [1] Correct unit

f) AB // CD (given)

$\therefore \angle BAD = \angle CDA$

and (alternate angles are equal, AB // CD)

$\angle ABC = \angle DCB$ [1] Correct reason

$\therefore \triangle ABE \,|||\, \triangle DCE$ (AAA)

[1] Correct proof

g) 998×1002

$= (1000 - 2)(1000 + 2)$ [1]

$= 1\,000\,000 - 4$

$= 999\,996$ [1]

Question 5

a) i) $P(\text{bus or train}) = \frac{42+22+26+34}{200} = \frac{31}{50}$ [1]

ii) $P(\text{bus and train}) = 0$ [1]

iii) $P(\text{not bus or train}) = 1 - \frac{31}{50} = \frac{19}{50}$ [1]

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

$2-2x+4 = 3x-9$ [1] Expanding

$6-2x = 3x-9$

$-5x = -15$

$x = 3$ [1] correct answer

ii) $\frac{2x+1}{3} - \frac{5x-1}{6} = 1$

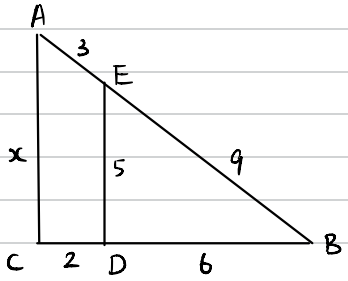
$4x+2-5x+1 = 6$ [1] working

$-x+3 = 6$

$-x = 3$

$x = -3$ [1] correct answer

c)



i) $\frac{BD}{BC} = \frac{6}{8} = \frac{3}{4}$ and $\frac{BE}{BA} = \frac{9}{12} = \frac{3}{4}$

$\therefore \frac{BD}{BC} = \frac{BE}{BA}$ [1] correct working

and $\angle B$ is common

$\therefore \triangle ABC \equiv \triangle EBD$ (SAS) [1] correct reason

ii) $\frac{6}{2+6} = \frac{5}{x}$ (matching sides of similar triangles are proportional)

$6x = 40$ [1] correct reason

$x = \frac{20}{3}$ cm [1] correct answer

d) $S = \frac{n}{2}(2a + (n-1)d)$

$\frac{2S}{n} = 2a + (n-1)d$

$(n-1)d = \frac{2S}{n} - 2a$ [1]

$(n-1)d = \frac{2S-2an}{n}$

$d = \frac{2S-2an}{n(n-1)}$ [1]

Also accept $d = \frac{2S}{n(n-1)} - \frac{2a}{n-1}$

Question 6

a) i) $\frac{1}{x^2+5x-6} = \frac{2}{2x^2+2x+12}$

$\frac{1}{x^2+5x-6} = \frac{1}{x^2+x+6}$

$x^2+5x-6 = x^2+x+6$ [1] working

$4x = 12$

$x = 3$ [1] correct answer

b) i) $2(x+4)^2 - 32x$

$= 2((x+4)^2 - 16x)$

$= 2(x^2+8x+16-16x)$ [1] working

$= 2(x^2-8x+16)$

$= 2(x-4)^2$ [1] correct answer

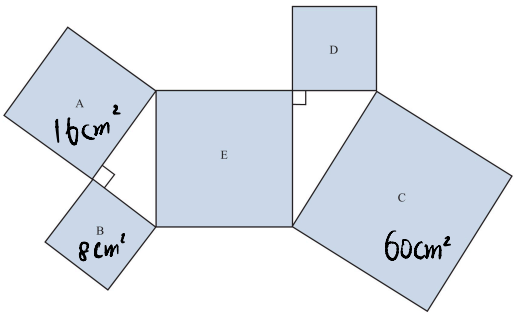
ii) $(x^2-6x+7)^2 - 4$

$= (x^2-6x+7+2)(x^2-6x+7-2)$ [1] working

$= (x^2-6x+9)(x^2-6x+5)$

$= (x-3)^2(x-1)(x-5)$ [2] correct factors

c)



Area E = Area A + Area B

$= 16 + 8$

$= 24\ cm^2$ [1]

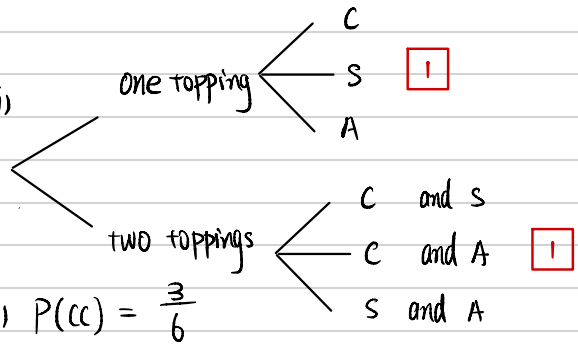
Area D = Area C − Area E

$= 60 - 24$

$= 36\ cm^2$ [1]

$\therefore$ Side length of square D = 6 cm [1]

d) i)



[1] [1]

ii) $P(CC) = \frac{3}{6}$

$= \frac{1}{2}$ [1]

Question 7

a) i) $\frac{50^{100}}{100^{50}}$

$= \frac{50^{50+50}}{(2\times 50)^{50}}$ 1

$= \frac{50^{50}\times 50^{50}}{2^{50}\times 50^{50}}$

$= \frac{50^{50}}{2^{50}}$

$= 25^{50}$ 1

$= 5^{100}$ Prefer prime base

ii) $\left(\frac{4}{5}\right)^{2024}\times(-1.25)^{2025}$

$= \left(\frac{4}{5}\right)^{2024}\times\left(-\frac{5}{4}\right)^{2024}\times\left(-\frac{5}{4}\right)$ 1

$= \left(\frac{4}{5}\right)^{2024}\times\left(\frac{5}{4}\right)^{2024}\times\left(-\frac{5}{4}\right)$

$= 1^{2024}\times\left(-\frac{5}{4}\right)$

$= \frac{-5}{4}$ 1

b) Let the speed of the boat be x km/h

$2(x+3) = 2.5(x-3)$ 1

$2x+6 = 2.5x - 7.5$

$-0.5x = -\frac{27}{2}$

$x = 27$ km/h 1

Distance $= 2(27+3)$

$= 60$ km 1

c)

1st \ 2nd	0	1	−2	3
0	*	1, 0	−2, 0	3, 0
1	0, 1	*	−2, 1	3, 1
−2	0, −2	1, −2	*	3, −2
3	0, 3	1, 3	−2, 3	*

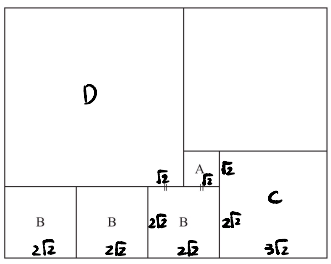
1 Array

1 correct outcomes

$P(1st < 2nd) = \frac{6}{12} = \frac{1}{12}$ $P(1st > 2nd) = \frac{6}{12} = \frac{1}{12}$ 1

∴ Player picks a card first doesn't have an advantage.

d)



Side of D $= 2\sqrt{2} + 5\sqrt{2}$

$= 7\sqrt{2}$ cm

∴ width of the rectangle $= 7\sqrt{2}$ cm 1

Area of A $= 2$ cm²

∴ side of A $= \sqrt{2}$ cm

∴ side of B $= 2\sqrt{2}$ cm

∴ side of C $= 3\sqrt{2}$ cm

∴ Length of the rectangle $= 9\sqrt{2}$ cm 1

∴ Area $= 9\sqrt{2}\times 7\sqrt{2}$

$= 63\times 2$

$= 126$ cm² 1

Question 8

a) $2a^2+b^2+c^2 = 2a(b+c)$

$2a^2+b^2+c^2-2ab-2ac = 0$

$a^2-2ab+b^2+a^2-2ac+c^2 = 0$ 1

$(a-b)^2+(a-c)^2 = 0$

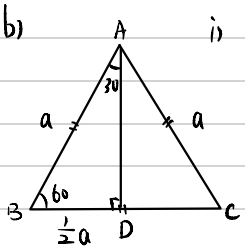
$a-b=0$ $a-c=0$ 1

$a=b$ $a=c$

∴ $a=b=c$

△ABC is an equilateral triangle 1

b)



i) △ABC is an equilateral triangle

Draw a height AD

Let $AB = AC = BC = a$

then $BD = \frac{1}{2}a$

∴ $AB = 2BD$ 1

$AD^2 = AB^2 - BD^2$

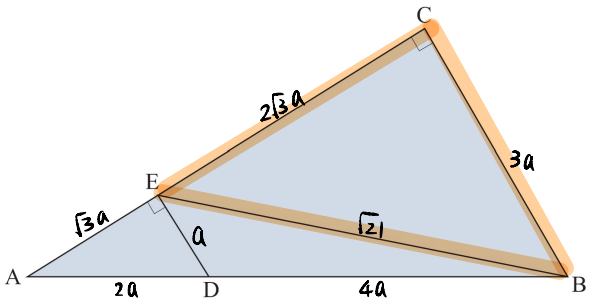
$= a^2 - \frac{1}{4}a^2$

$= \frac{3}{4}a^2$

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

∴ $AD = \sqrt{3}BD$ 1

ii)



In △AED and △ACB

∠A is a common angle

$\angle AED = \angle ACB = 90^\circ$ (given)

∴ △AED ||| △ACB (equiangular)

∴ $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$ 1

(matching sides of similar triangles are proportional)

Let $DE = a$

∴ $AD = 2a$ and $AE = \sqrt{3}a$ (proved from part i)

Since $AD : DB = 1 : 2$

then $DB = 4a$ and $AB = 6a$

Since △ABC is a 30-60-90 triangle

∴ $AB = 2BC$

$\therefore$ $BC = 3a$ and $AC = 3\sqrt{3}\,a$

$\therefore$ $EC = 3\sqrt{3}a - \sqrt{3}a$

$EC = 2\sqrt{3}a$ [1]

$\triangle BD$ is a right-angled triangle

$\therefore$ $EB^2 = EC^2 + BC^2$

$(\sqrt{21})^2 = (2\sqrt{3}a)^2 + (3a)^2$

$21 = 12a^2 + 9a^2$

$21 = 21a^2$

$a^2 = 1$

$a = 1$ since $a > 0$

$\therefore$ $BC = 3 \times 1$

$= 3\text{cm}$ [1]

c) $(a^2-1)(b^2-1) + 4ab$

$= a^2b^2 - a^2 - b^2 + 1 + 4ab$

$= a^2b^2 + 1 + 2ab - a^2 - b^2 + 2ab$

$= (ab+1)^2 - (a^2 - 2ab + b^2)$ [1]

$= (ab+1)^2 - (a-b)^2$

$= (ab+1+a-b)(ab+1-a+b)$ [1]

d) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}}$

$= \sqrt{\frac{xy}{y^2}} + \sqrt{\frac{xy}{x^2}}$ [1] since $x+y=-4$ $xy=2$ then x and y are both negative

$= -\frac{\sqrt{xy}}{y} - \frac{\sqrt{xy}}{x}$

$= -\sqrt{xy}\left(\frac{1}{y} + \frac{1}{x}\right)$

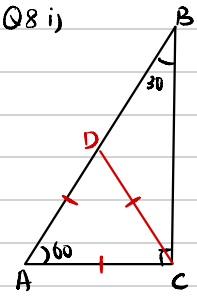
$= -\sqrt{xy}\left(\frac{x+y}{yx}\right)$ [1]

$= -\sqrt{2}\left(\frac{-4}{2}\right)$

$= 2\sqrt{2}$ [1]

Alternative solution for Q8b

Q8 i)



Construct D on AB such that $AC = AD = DC$

$\angle ACD = 60°$ (angle of equilateral $\triangle ACD$)

$\angle DCB = 90° - 60°$

$= 30°$ (adjacent angles)

$\triangle BCD$ is isosceles ($\angle DBC = \angle DCB = 30°$)

$DB = DC$ (equal sides opposite equal angles of isosceles $\triangle BCD$)

$DB = AC = AD$ (all equal DC)

Let $AC = x$

$AB = AD + DB$

$= 2x$

$= 2AC$ so the hypotenuse is twice as long as the shortest side.

$BC^2 = AB^2 - AC^2$

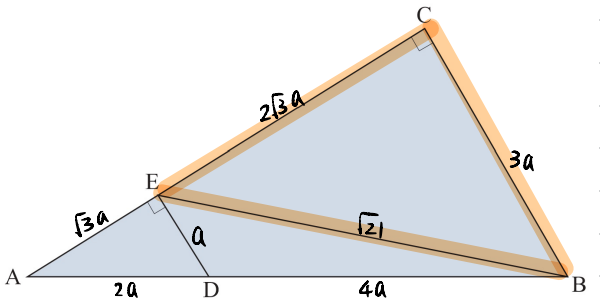
$= (2x)^2 - x^2$

$= 3x^2$

$BC = \sqrt{3}x$ so the other side is $\sqrt{3}$

$= \sqrt{3}AC$ times the shortest side.

ii)



$\triangle AED$ and $\triangle ACB$ both are the 30-60-90 triangles.

$\therefore$ $\frac{AD}{DE} = \frac{AB}{BC} = \frac{2}{1}$ (from part i)

$\frac{AE}{DE} = \frac{AC}{BC} = \frac{\sqrt{3}}{1}$

$\therefore$ $\frac{AD}{AB} = \frac{DE}{BC} = \frac{AE}{AC}$

Let $DE = a$

$\therefore$ $AD = 2a$ and $AE = \sqrt{3}a$

Since $AD : DB = 1 : 2$

then $DB = 4a$ and $AB = 6a$

Since $\triangle ABC$ is a 30-60-90 triangle

$\therefore$ $AB = 2BC$

$\therefore$ $BC = 3a$ and $AC = 3\sqrt{3}\,a$

$\therefore$ $EC = 3\sqrt{3}a - \sqrt{3}a$

$EC = 2\sqrt{3}a$ [1]

ΔBDC is a right-angled triangle

$\therefore$ $EB^2 = EC^2 + BC^2$

$(\sqrt{21})^2 = (2\sqrt{3}a)^2 + (3a)^2$

$21 = 12a^2 + 9a^2$

$21 = 21a^2$

$a^2 = 1$

$a = 1$ since $a > 0$

$\therefore$ $BC = 3 \times 1$

$= 3\text{ cm}$ [1]

Alternative solution for Q8d

d) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}}$

$= \sqrt{\left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}}\right)^2}$

$= \sqrt{\frac{x}{y} + 2 + \frac{y}{x}}$

$= \sqrt{\frac{x^2 + 2xy + y^2}{2}}$

$= \sqrt{\frac{(x+y)^2}{2}}$

$= \sqrt{\frac{(-4)^2}{2}}$

$= \sqrt{8}$

$= 2\sqrt{2}$

x and y must be the same sign since $xy > 0$

so $\frac{x}{y} > 0$ $\frac{y}{x} > 0$