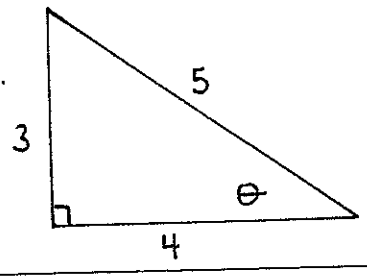
Year 10 Common test 1 Name:_____

2009

SECTION 1 – 30 MINUTES

NON CALCULATOR

1. Express 0.24 as a simple fraction	
2. What is the HCF of $2x^2y^3$ and $6xy^2$	
3. Find 12 ½% of $840	
4. What fraction is half way between $\frac{2}{3}$ and $\frac{4}{5}$?	
5. Find the value of $45 \div 0.01$	
6. $3 - \frac{2}{1+\frac{1}{2}}$	
7. Evaluate $-x^2$ if $x = -4$	
8. Factorise $8x^2 - 8x$	
9. Solve $x^2 = 16$	
10. Find the value of A if $3\sqrt{7} = \sqrt{A}$	
11. Find the value of 119 x 25 x 40	
12. Factorise $81 - m^2$	
13. If 3% of $x = y$ what is 30% of $2x$	
14. Evaluate $27^2 - 25^2$	

15. Find the value of the tenth term in 7, 4, 1, ...	
16. Given $2 \cdot 546 \times 3 \cdot 2 = 8 \cdot 1472$ Find , $814 \cdot 72 \div 32$	
17. If $72 = 2^x \times 3^y$ Find the value of $2^y \times 3^x$	
18. Write a quadratic equation with solutions $x = -1$ and $x = 4$.	
19. $6x^2 - 17x + 12 = 0$ has one solution of $x = 1 \cdot 5$, what is the other solution?	
20. $(x + A)^2 = x^2 + 14x + B$ Find the value of A.	
21. Solve simultaneously, $x + y = 4$ and $x - y = 2$	
22.  $\sin\theta = ?$	
23. Simplify $(x + 1)^2 - (x - 1)^2$	
24. A dice is rolled three times. What is the probability of getting exactly two tails?	
25. From a group of 5 boys and 4 girls one boy and one girl are chosen at random to meet the queen. What is the probability that Jack and Sally are both chosen?	

SYDNEY TECHNICAL HIGH SCHOOL
2009 YEAR 10 COMMON TEST 1

Name: _____

Teacher: _____

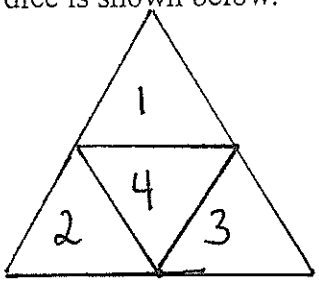
Q1	Q2	Q3	Q4	Q5	Non Cal	/100

Section 2: (70 minutes) – **Show all necessary working.**
- **Calculators allowed.**

Question 1: Probability (15 marks)

1. The probability of rain on any given day in town A is given as 85%. What is the probability that it doesn't rain on any given day in town A?	
2. A bag contains three times as many yellow marbles as blue marbles. If one marble is chosen at random, find the probability that it is yellow.	
3. How many two digit numbers can be formed from the list 1, 2, 3, 4 if a) repetition is allowed b) no repetition is allowed	a) b)
4. A coin and a die are tossed together. How many outcomes are in the sample space?	
5. A die is rolled once, what is the probability of the number on the uppermost face being a multiple of 3?	

6. The net of a 4 sided dice is shown below.



This dice is rolledtwice and the numbers on the uppermost faces added together.

a) Draw a diagram showing all the outcomes in the sample space.

(1)

b) What is the probability that the sum is:

(i) 1 _____

(ii) 3 _____

(iii) 8 _____

(iv) a prime number _____

(4)

7. A box contains 5 light globes, 2 of which are faulty. Two globes are selected, one at a time, without replacement. By drawing an appropriate diagram, or otherwise find the probability that

(i) both globes are faulty

(ii) only one of the globes is faulty

(4)

Question 2 : **Factorising (15 marks)**

1. Factorise a) $6x - 12$ _____

b) $-x^2 - x$ _____

c) $x^2 - 9x$ _____

d) $x^2 - 1$ _____

e) $3(x + 1) + y(x + 1)$ _____

(5)

2. Fully Factorise

a) $m^3 - 81m$ _____

_____

b) $6x^2 + x - 12$ _____

_____

c) $2x^3 - 6x^2 + 4x$ _____

_____

d) $6x - 6y + x^2 - xy$ _____

_____

e) $x^4 - y^4$ _____

_____

(10)

Question 3: Quadratic Equations (15 marks)

1. Which of the following is not a quadratic equation?
   (A) $x^2 - 3x - 4$
   (B) $2x^2 = x - 4$
   (C) $x(x + 1) = 6$
   (D) $x^2 - 9 = 0$

(1)

2. $x = 4$ is one solution of:
   (A) $x^2 + 4x = 0$
   (B) $x^2 - 3x = 4$
   (C) $x^2 = 4$
   (D) $x^2 - 4x + 4 = 0$

(1)

3. Solve each of the following;

a) $x^2 - 2 = 0$

b) $(x + 1)(2x - 3) = 0$

c) $x^2 = 3x$

d) $x^2 + 7x + 10 = 0$

(4)

4. a) Factorise $4x^2 - 13x - 12$ (1)

b) Hence, solve $4x^2 - 13x - 12 = 0$ (1)

5. Solve $(3x - 1)^2 = 100$ (2)

---

6. Solve $3x^2 - x - 2 = 0$, leaving your answers correct to 2 decimal places (2)

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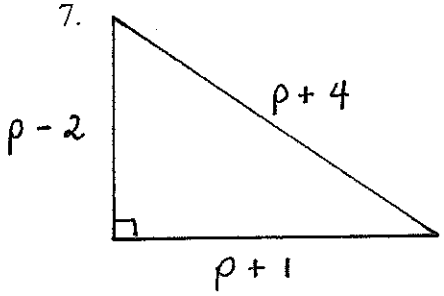
7. a) Explain why $(p + 4)^2 = (p - 2)^2 + (p + 1)^2$



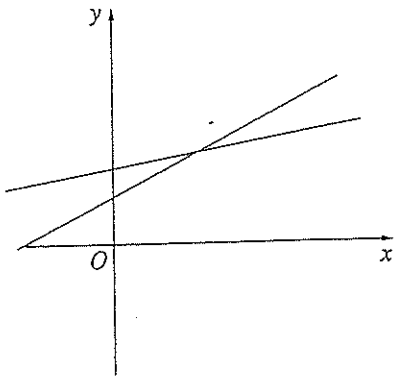
b) Hence, find the value of p (3)

Question 4: Simultaneous Equations. (15 marks)

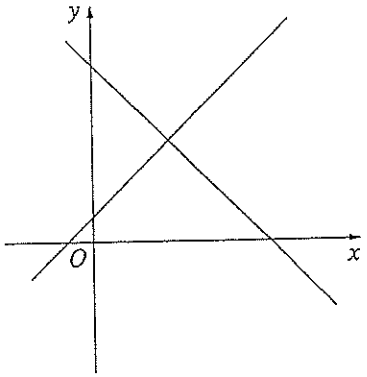
1. George drew a correct diagram that gave the solution to the simultaneous equations $y = 2x - 5$ and $y = x + 6$.

Which diagram did he draw? (1)

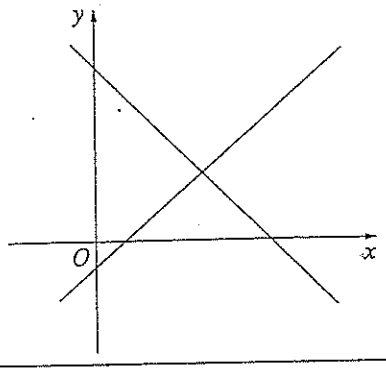
(A)



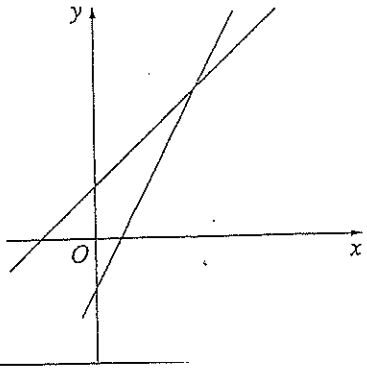
(B)



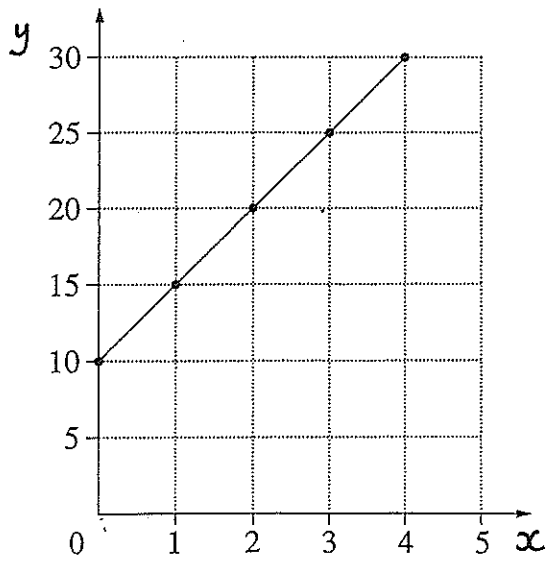
(C)



(D)



2.



The line $y = 5x + 10$ is shown on the number plane.

Draw the line $y = 10x$ on the number Plane.

Write down the point of intersection. (2)

3.

Magazines	\$4 each
Comics	\$3 each

Sarah bought x magazines and y comics at the above prices.

She bought nine more magazines than comics, and spent \$120 altogether.

Which pair of simultaneous equations could be solved to find how many of each she bought?

(A) $4x + 3y = 120$
$x - y = 9$

(B) $4x + 3y = 120$
$y - x = 9$

(C) $\frac{x}{4} + \frac{y}{3} = 120$
$x - y = 9$

(D) $\frac{x}{4} + \frac{y}{3} = 120$
$y - x = 9$

(1)

4. Solve simultaneously;

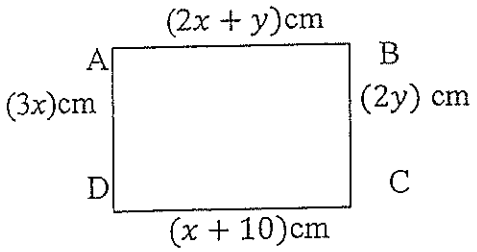
a) $y = 2x$ and $3x + 2y = 14$

(2)

b) $3x - 2y = 11$ and
$4x + 3y = 43$

(2)

5.



i. ABCD is a rectangle. Explain why $3x = 2y$?

ii. By solving a pair of simultaneous equations find the value of x and y

iii. What is the perimeter of ABCD?

(4)

6. Kevin paid $320 in cash for a Wii console and game. He paid in $20 notes and $10 notes and there were 23 notes altogether.

a) If Kevin had x $20 notes, how many $10 notes did he have?

_____

b) Write down an equation you can solve to find the number of $20 notes

_____

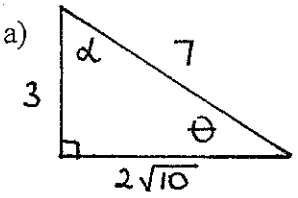
c) How many $20 notes did Kevin have?

_____

(3)

Question 5: Trigonometry and Interest. (15 marks)

a)

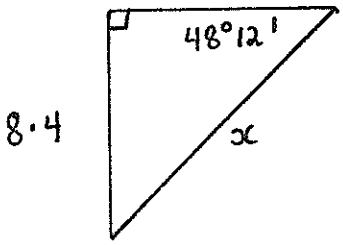


Write down the value of cos θ

(1)

_____

b) Find the value of x in:



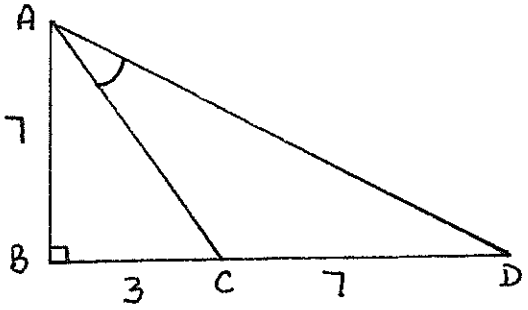
_____

_____

_____

(2)

c) Find <CAD, correct to the nearest degree



_____

_____

_____

_____

(3)

d) Find the simple interest earned _____

if $4000 is invested for _____

15 months at 6% p.a. _____

(2)

e) Arkin borrows $8000 at 18% p.a
simple interest over 5 years. Find:

i) The interest charged _____

ii) The amount of each repayment _____
if Arkin repays the principal and _____
interest in equal monthly _____
instalments over the 5 years

(3)

f) Kerry has a credit card. She is charged 0.05% compound interest per day on outstanding balances.
How much interest is Kerry charged on an amount of $250, which is outstanding on her credit card for 30 days?

(A) $3.75
(B) $3.78
(C) $253.75
(D) $253.78

(1)

g) $2000 is invested at 6.6% p.a, compounded monthly for 3 years.

i) What is the monthly rate of interest _____

ii) Calculate the interest earned on this _____
investment over the 3 years. _____
_____

(3)

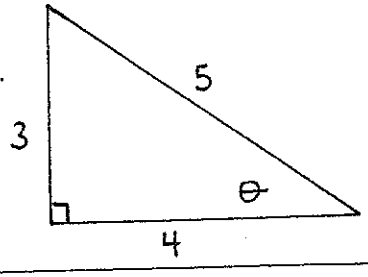
Year 10 Common test 1 Name:_____

2009

SECTION 1 – 30 MINUTES

NON CALCULATOR

1. Express 0.24 as a simple fraction	$6/25$
2. What is the HCF of $2x^2y^3$ and $6xy^2$	$2xy^2$
3. Find 12 ½% of $840	$105
4. What fraction is half way between $\frac{2}{3}$ and $\frac{4}{5}$?	$\frac{11}{15}$
5. Find the value of $45 \div 0.01$	4500
6. $3 - \frac{2}{1+\frac{1}{2}}$	$1\frac{2}{3}$
7. Evaluate $-x^2$ if $x = -4$	-16
8. Factorise $8x^2 - 8x$	$8x(x-1)$
9. Solve $x^2 = 16$	$x = \pm 4$
10. Find the value of A if $3\sqrt{7} = \sqrt{A}$	63
11. Find the value of 119 x 25 x 40	119 000
12. Factorise $81 - m^2$	$(9+m)(9-m)$
13. If 3% of $x = y$ what is 30% of $2x$	$20y$
14. Evaluate $27^2 - 25^2$	104

15. Find the value of the tenth term in 7, 4, 1, ...	-20
16. Given $2 \cdot 546 \times 3 \cdot 2 = 8 \cdot 1472$ Find, $814 \cdot 72 \div 32$	25.46
17. If $72 = 2^x \times 3^y$ Find the value of $2^y \times 3^x$ $x = 3$ $y = 2$	$4 \times 27 = 108$
18. Write a quadratic equation with solutions $x = -1$ and $x = 4$.	$(x+1)(x-4) = 0$
19. $6x^2 - 17x + 12 = 0$ has one solution of $x = 1 \cdot 5$, what is the other solution? $(3x - 4)(2x - 3) = 0$	$x = \frac{4}{3}$
20. $(x + A)^2 = x^2 + 14x + B$ Find the value of A.	7
21. Solve simultaneously, $x + y = 4$ and $x - y = 2$	$x = 3$, $y = 1$
22.  $\sin\theta = ?$	$\frac{3}{5}$
23. Simplify $(x + 1)^2 - (x - 1)^2$	$4x$
24. A dice is rolled three times. What is the probability of getting exactly two tails?	$\frac{3}{8}$
25. From a group of 5 boys and 4 girls one boy and one girl are chosen at random to meet the queen. What is the probability that Jack and Sally are both chosen?	$\frac{1}{20}$

SYDNEY TECHNICAL HIGH SCHOOL
2009 YEAR 10 COMMON TEST 1

Name: _____

Teacher: _____

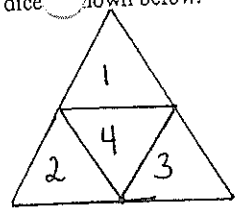
Q1	Q2	Q3	Q4	Q5	Non Cal	____ 100

Section 2: (70 minutes) – Show all necessary working.
- Calculators allowed.

Question 1: Probability (15 marks)

1. The probability of rain on any given day in town A is given as 85%. What is the probability that it doesn't rain on any given day in town A?	15%
2. A bag contains three times as many yellow marbles as blue marbles. If one marble is chosen at random, find the probability that it is yellow.	$\frac{3}{4}$
3. How many two digit numbers can be formed from the list 1, 2, 3, 4 if a) repetition is allowed b) no repetition is allowed	a) $4^2 = 16$ b) 12
4. A coin and a die are tossed together. How many outcomes are in the sample space? H T 1 2 3 4 5 6	12
5. A die is rolled once, what is the probability of the number on the uppermost face being a multiple of 3? 1 2 3 4 5 6	$\frac{1}{3}$

6. The net of a 4 sided dice shown below.



This dice is rolled once and the numbers on the uppermost faces added together.

a) Draw a diagram showing all the outcomes in the sample space. (1)

	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8

b) What is the probability that the sum is: (4)

(i) 1 — 0

(ii) 3 — $2/16 = 1/8$

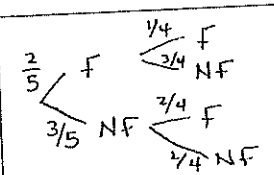
(iii) 8 — $1/16$

(iv) a prime number — $9/16$

7. A box contains 5 light globes, 2 of which are faulty. Two globes are selected, one at a time, without replacement. By drawing an appropriate diagram, or otherwise find the probability that

(i) both globes are faulty

(ii) only one of the globes is faulty



(i) $\frac{2}{5} \times \frac{1}{4} = \frac{1}{10}$

(ii) $\frac{2}{5} \times \frac{3}{4} + \frac{3}{5} \times \frac{2}{4}$ (4)

$= \frac{3}{5}$

Question 2 : Factorising (15 marks)

1. Factorise

a) $6x - 12$ $6(x-2)$

b) $-x^2 - x$ $-x(x+1)$

c) $x^2 - 9x$ $x(x-9)$

d) $x^2 - 1$ $(x+1)(x-1)$

e) $3(x+1) + y(x+1)$ $(x+1)(3+y)$ (5)

2. Fully Factorise

a) $m^3 - 81m$ $m(m^2-81)$
$= m(m+9)(m-9)$

b) $6x^2 + x - 12$ $(2x+3)(3x-4)$ $2x+3$, $3x-4$

c) $2x^3 - 6x^2 + 4x$ $2x(x^2-3x+2)$
$= 2x(x-2)(x-1)$

d) $6x - 6y + x^2 - xy$ $6(x-y) + x(x-y)$
$= (x-y)(6+x)$

e) $x^4 - y^4$ $= (x^2-y^2)(x^2+y^2)$
$= (x+y)(x-y)(x^2+y^2)$ (10)

Question 3: Quadratic Equations (15 marks)

1. Which of the following is not a quadratic equation?
   (A) $x^2 - 3x - 4$
   (B) $2x^2 = x - 4$
   (C) $x(x+1) = 6$
   (D) $x^2 - 9 = 0$

A (1)

2. $x = 4$ is one solution of:
   (A) $x^2 + 4x = 0$
   (B) $x^2 - 3x = 4$
   (C) $x^2 = 4$
   (D) $x^2 - 4x + 4 = 0$

B (1)

3. Solve each of the following;

a) $x^2 - 2 = 0$
$x = \pm\sqrt{2}$

b) $(x+1)(2x-3) = 0$
$x = -1, 3/2$

c) $x^2 = 3x$
$x = 0$
$x = 3$

d) $x^2 + 7x + 10 = 0$
$(x+5)(x+2) = 0$
$x = -5, x = -2$ (4)

4. a) Factorise $4x^2 - 13x - 12$ $= (4x+3)(x-4)$ (1)

$2x$ $4x + 3$, 3
$2x$ $1x - 4$, 16

b) Hence, solve $4x^2 - 13x - 12 = 0$ $(4x+3)(x-4) = 0$ (1)
$x = -\frac{3}{4}, \quad x = 4.$

5. Solve $(3x-1)^2 = 100$ (2)

$3x - 1 = 10$, $3x - 1 = -10$

$3x = 11$ $3x = -9$

$x = \frac{11}{3}$ or $x = -3$

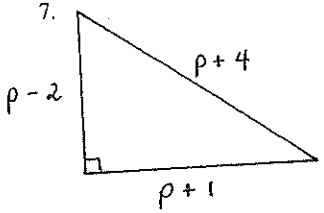
6. Solve $3x^2 - x - 2 = 0$, leaving your answers correct to 2 decimal places (2)

$x = \frac{1 \pm \sqrt{1 - 3 \times 3 \times -2}}{6}$

$x = \frac{1 \pm \sqrt{19}}{6}$

$x = 0.89, -0.56$ (2dp)

7.



a) Explain why $(p+4)^2 = (p-2)^2 + (p+1)^2$

Pythagoras' theorem.

b) Hence, find the value of p (3)

$p^2 + 8p + 16 = p^2 - 4p + 4 + p^2 + 2p + 1$

$p^2 + 8p + 16 = 2p^2 - 2p + 5$

$-p^2 + 10p + 11 = 0$

$p^2 - 10p - 11 = 0$

$(p - 11)(p + 1) = 0$

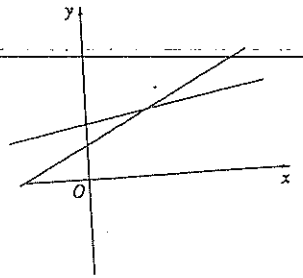
$p > 0 \therefore p = 11$

Question 4: Simultaneous ations. (15 marks)

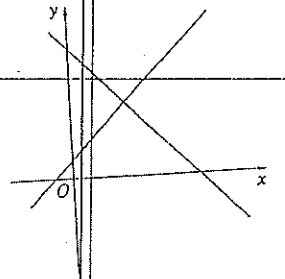
1. George drew a correct diagram that gave the solution to the simultaneous equations $y = 2x - 5$ and $y = x + 6$. (1)

Which diagram did he draw?

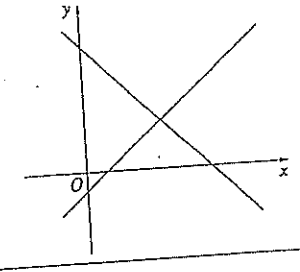
(A)



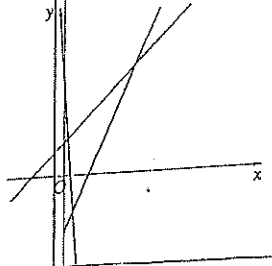
(B)



(C)



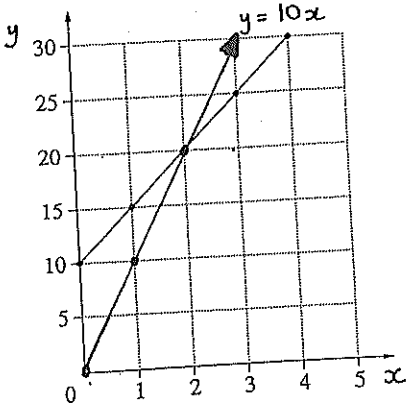
(D)



D

2. The line $y = 5x + 10$ is shown on the number plane.

Draw the line $y = 10x$ on the number Plane.



Write down the point of intersection. (2, 20) (2

3.

Magazines	$4 each
Comics	$3 each

Sarah bought x magazines and y comics at the above prices.

$x = y + 9$ $\quad x - y = 9$

She bought nine more magazines than comics, and spent $120 altogether.

Which pair of simultaneous equations could be solved to find how many of each she bought?

(A) $4x + 3y = 120$
$x - y = 9$

(B) $4x + 3y = 120$
$y - x = 9$

(C) $\frac{x}{4} + \frac{y}{3} = 120$
$x - y = 9$

(D) $\frac{x}{4} + \frac{y}{3} = 120$
$y - x = 9$

A

(1)

4. Solve simultaneously;

a) $y = 2x$ and $3x + 2y = 14$

Sub ① into ②

$3x + 2(2x) = 14$

$7x = 14$

$x = 2$

$y = 4$

(2)

b) $3x - 2y = 11$ and ① × 3
$4x + 3y = 43$ ② × 2

$9x - 6y = 33$]
$8x + 6y = 86$] +

$17x = 119$

$x = 7$

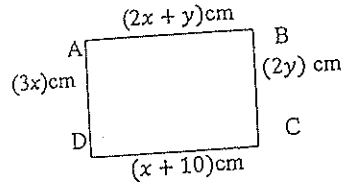
$21 - 2y = 11$

$2y = 10$

$y = 5$ (2)

ie $x = 7$, $y = 5$

5.



i. ABCD is a rectangle. Explain why $3x = 2y$?

opposite sides of a rectangle equal.

ii. By solving a pair of simultaneous equations find the value of x and y

$2x + y = x + 10$

$x + y = 10$ - ①

$2x + 2y = 20$ - ③

$3x = 2y$

$3x - 2y = 0$ - ②

$5x = 20$

$x = 4$, $y = 7$

iii. What is the perimeter of ABCD?

$P = 2 \times 12 + 14 \times 2$

$= 52$ cm

(4)

6. Kevin paid $320 in cash for a Wii console and game. He paid in $20 notes and $10 notes and there were 23 notes altogether.

a) If Kevin had x $20 notes, how many $10 notes did he have?

$23 - x$

b) Write down an equation you can solve to find the number of $20 notes

$20x + 10(23 - x) = 320$

$10x + 230 = 320$

$10x = 90$

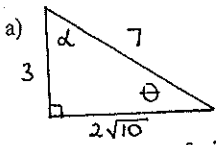
c) How many $20 notes did Kevin have?

9

(3)

Question 5: Trigonometry and Interest. (15 marks)

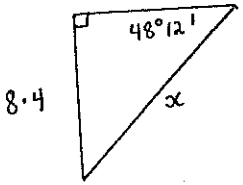
a)



Write down the value of $\cos\theta$

$\frac{2\sqrt{10}}{7}$ (1)

b) Find the value of x in:



$\sin 48°12' = 8.4/x$

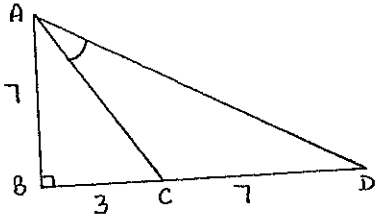
$x = 8.4 \div \sin 48°12'$

$x = 11.2679\ldots$

$= 11.3$ (1dp)

(2)

c) Find <CAD, correct to the nearest degree



$\angle BAD = \theta$ $\quad \tan\theta = 10/7$

$\theta = 55°$

$\angle BAC = \alpha$ $\quad \tan\alpha = 3/7$

$\alpha = 23°$

$\therefore \angle CAD = 32°$

(3)

d) Find the simple interest earned if $4000 is invested for 15 months at 6% p.a.

$I = 4000 \times 0.06 \times 15/12$

$= \$300$

(2)

e) Arkin borrows $8000 at 18% p.a

simple interest over 5 years. Find:

i) The interest charged $7200

ii) The amount of each repayment (8000 + 7200) ÷ 60

if Arkin repays the principal and interest in equal monthly instalments over the 5 years $253.33.

(3)

f) Kerry has a credit card. She is charged 0.05% compound interest per day on outstanding balances.
How much interest is Kerry charged on an amount of $250, which is outstanding on her credit card for 30 days?

(A) $3.75
(B) $3.78
(C) $253.75
(D) $253.78

A.

(1)

g) $2000 is invested at 6.6% p.a, compounded monthly for 3 years.

i) What is the monthly rate of interest 0.55% or 0.0055

ii) Calculate the interest earned on this investment over the 3 years. $I = 2000(1.0055)^{36} - 2000$

$= \$436.60.$

(3)