Student's Name:_____ Teachers Name:_____

# SYDNEY TECHNICAL HIGH

# YEAR 10

# MAY ASSESSMENT 2011

**Times: 70 minutes -** **No calculator - 15 minutes Question 1**

**Calculator - 55 minutes Questions 2-5**

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**Instructions:**

The paper contains 5 questions of equal value

- Question 1 (15 minutes) **No calculators allowed**⊗

  *Teachers will collect this question after 15 minutes*

- Questions 2-5: (55 minutes)
  - Calculators allowed
  - Write your answers in the space provided
  - Marks maybe deducted for poorly set out work, or for insufficient working.

| Question 1 Non calculator | Question 2 Factorising | Question 3 Simultaneous Equations | Question 4 Quadratic Equations | Question 5 Probability |
|---|---|---|---|---|
| /12 | /12 | /12 | /12 | /12 |

| Total |
|---|
| /60 |

**Question 2 – 12 marks**

1. Factorise each of the following expressions (1 mark each)

a) $6x^2 - 12x$

b) $-x - xy$

c) $m^2 - 16n^2$

d) $x^2 + x - 12$

2. Fully factorise each of the following expressions. ( 2 marks each)

a) $ax + ay + bx + by$

b) $6x^3 + 17x^2 + 5x$

c) $x^4 - 81$

d) $3x + 3y - x^2 + y^2$

**Question 3 – 12 marks**

1. If $a = -2$ and $3a + 7b = -10$, find the value of $b$. (1)

2. Solve the following pairs of simultaneous equations (2 marks each).

(a) $3x - 2y = 19$ and $y = 8 - 2x$

(b) $4x + 5y = 24$ and $2x - 5y = 6$

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

3. Antony is 30 years older than his daughter Stella.

In five years time Antony will be 4 times as old as Stella.

(a) If Stella is currently $x$ years old, write down an expression for Anthony's current age _____ (1)

(b) Write down an expression, in terms of $x$, for both Antony's and Stella's ages in five years _____ (2)

_____

(c) Hence, find the value of $x$ (2)

_____

_____

_____

_____

**Question 4 – 12 marks**

1. Solve each of the following equations (2 marks each)

(a) $x(x-2)=0$

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

(c) $x^2+2x=8$

(d) $6x^2-x-1=0$

2. Use the quadratic formula to solve the following equation.

$$2x^2-8x+1=0$$

Express your answers correct to 2 decimal places. (2)

3. Solve $x+\frac{10}{x}=7$ (2)

**Question 5 – 12 marks**

1. A coin is tossed three times. How many outcomes are in the sample space? (1)

2. A bag contains some marbles. The probability of selecting a blue marble at random from this bag is $\frac{3}{8}$. Which of the following could describe the marbles that are in the bag? (1)

   (a) 3 blue, 8 red

   (b) 6 blue, 11 red

   (c) 3 blue, 4 red, 4 green

   (d) 6 blue, 5 red, 5 green

3. A die has faces numbered 1 to 6. The die is biased so that the number 6 will appear more often than each of the other numbers. The numbers 1 to 5 are equally likely to occur. The die was rolled 1200 times and it was noted that the 6 appeared 450 times. Which statement is correct? (1)

   (a) The probability of rolling the number 5 is expected to be $\frac{1}{7}$.

   (b) The number 6 is expected to appear 2 times as often as any other number.

   (c) The number 6 is expected to appear 3 times as often as any other number.

   (d) The probability of rolling an even number is expected to be equal to the probability of rolling an odd number.

4. A fair six-sided die is rolled twice. The number on the upper most face is noted each time.

(4)

i) List all the possible outcomes, using a table, for the two rolls of this die.

ii) Find the probability of obtaining,

(a) A double _____

(b) A total of 10 _____

(c) The number recorded on the first roll being greater than the number recorded on the second roll of the die._____

5. Two bags sit on the teacher's desk. Each bag contains balls of the same size and shape. Bag 1 has 3 green balls and 3 red balls, while Bag 2 contains 2 green balls and one red ball. A ball is chosen at random from each bag and its colour noted.

By using a tree diagram, or otherwise, find the probability of obtaining at least one red ball.

(2)

6. Cecil invited 175 movie critics to preview his new movie. After seeing the movie, he conducted a survey. Cecil has almost completed the two-way table.

| | *Aged <40* | *Aged≥40* | *Totals* |
|---|---|---|---|
| Movie critics who liked the movie | 65 | | 120 |
| Movie critics who did not like the movie | | 31 | |
| Totals | | **A** | 175 |

(i) Determine the value of **A**.

_____ (1)

(ii) A movie critic is selected at random.
What is the probability that the critic was less than 40 years old and did not like the movie?

_____

_____

_____ (1)

(iii) Cecil believes that his movie will be a box office success if 65% of the critics who were surveyed liked the movie.

Will this movie be considered a box office success? Justify your answer.

_____

_____

_____ (1)

End of Paper

NAME _____ CLASS _____

**Question 1 – Non Calculator –12 marks.**

(1 mark each )

| | Answers |
|---|---|
| 1. Find $\frac{1}{4}+\frac{15}{16}\times\frac{32}{45}$ | |
| 2. Express $1\frac{3}{4}\%$ as a decimal | |
| 3. Write 1754890 correct to 2 significant figures | |
| 4. 10% GST is included in the cost of a meal. If the diner paid \$132 for the meal, how much GST was included in the bill? | |
| 5. Find the value of $m$ given $(5^4\times5^8)^2=25^m$ | |
| 6. Write 0.00809751 correct to 3 significant figures. | |
| 7. If $a=-5$ and $b=-4$, find the value of $-a^2b$ | |
| 8. Write down the answer to the following product in Scientific notation $(6.4\times10^3)\times(2\times10^5)$ | |
| 9. $f(x)=x^2-2x+1$. Find a simplified expression for, $f(1-m)$. | |
| 10. If $(Ax+5)^2=16x^2+Bx+25$. *Given* $A>0$, What is the value of $(A+B)$? | |
| 11. Simplify $\frac{3x-3y}{2y-2x}$ | |
| 12. $x^2+8x+7=(x+4)^2+\square$ What is the value of $\square$ ? | |

NAME _____ CLASS _____

**Question 1 – Non Calculator –12 marks.**

(1 mark each )

| | Answers |
|---|---|
| 1. Find $\frac{1}{4}+\frac{15}{16}\times\frac{32}{45}$ | $\frac{11}{12}$ |
| 2. Express $1\frac{3}{4}\%$ as a decimal | 0.0175 |
| 3. Write $1\dot{7}5\dot{4}890$ correct to 2 significant figures | 18 000 00 |
| 4. 10% GST is included in the cost of a meal. If the diner paid \$132 for the meal, how much GST was included in the bill? | \$12 |
| 5. Find the value of $m$ given $(5^4\times5^8)^2=25^m$ | $m=12$ |
| 6. Write 0.00809751 correct to 3 significant figures. | 0.00810 |
| 7. If $a=-5$ and $b=-4$, find the value of $-a^2b$ | 100 |
| 8. Write down the answer to the following product in Scientific notation $(6.4\times10^3)\times(2\times10^5)$ | $1.28\times10^9$ |
| 9. $f(x)=x^2-2x+1$. Find a simplified expression for, $f(1-m)$. | $m^2$ |
| 10. If $(Ax+5)^2=16x^2+Bx+25$. *Given* $A>0$, What is the value of $(A+B)$? | 44 |
| 11. Simplify $\frac{3x-3y}{2y-2x}$ | $\frac{-3}{2}$ |
| 12. $x^2+8x+7=(x+4)^2+\square$ What is the value of $\square$ ? | $-9$ |

**Question 2 – 12 marks**

1. Factorise each of the following expressions (1 mark each)

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

b) $-x-xy$ $-x(1+y)$

c) $m^2-16n^2$ $(m+4n)(m-4n)$

d) $x^2+x-12$ $(x+4)(x-3)$

2. Fully factorise each of the following expressions. ( 2 marks each)

a) $ax+ay+bx+by$

$=a(x+y)+b(x+y)$

$=(x+y)(a+b)$

b) $6x^3+17x^2+5x$

$=x(6x^2+17x+5)$

$=x(3x+1)(2x+5)$

c) $x^4-81$

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

$=(x+3)(x-3)(x^2+9)$

d) $3x+3y-x^2+y^2$

$=3(x+y)-(x^2-y^2)$

$=3(x+y)-(x+y)(x-y)$

$=(x+y)(3-x+y)$

Question 3 – 12 marks

1. If $a = -2$ and $3a + 7b = -10$, find the value of $b$. (1)

$-6 + 7b = -10$

$b = -4/7$

2. Solve the following pairs of simultaneous equations (2 marks each).

(a) $3x - 2y = 19$ and $y = 8 - 2x$

$3x - 2(8-2x) = 19$

$3x - 16 + 4x = 19$

$7x = 35$

$x = 5$

$y = -2$

(b) $4x + 5y = 24$ and $2x - 5y = 6$

① + ② $6x = 30$

$x = 5$

$\therefore 20 + 5y = 24$

$y = 4/5$

ie $x = 5, y = 4/5$

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

① × 3 $9x - 6y = 33$

② × 2 $8x + 6y = 86$ +

$17x = 119$

$x = 7$

$y = 5$

3. Antony is 30 years older than his daughter Stella.

In five years time Antony will be 4 times as old as Stella.

(a) If Stella is currently $x$ years old, write down an expression for Anthony's current age $x + 30$ (1)

(b) Write down an expression, in terms of $x$, for both Antony's and Stella's ages in five years Antony : $x + 35$ (2)

Stella : $x + 5$

(c) Hence, find the value of $x$ (2)

$4(x+5) = x + 35$

$4x + 20 = x + 35$

$3x = 15$

$x = 5$

**Question 4 – 12 marks**

1. Solve each of the following equations (2 marks each)

(a) $x(x-2)=0$

$x=0,\ x=2$

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

$x=2,\ x=-2/3$

(c) $x^2+2x=8$

$x^2+2x-8=0$

$(x+4)(x-2)=0$

$x=-4,\ x=2$

(d) $6x^2-x-1=0$

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

$x=-1/3,\ 1/2$

2. Use the quadratic formula to solve the following equation.

$2x^2-8x+1=0$

Express your answers correct to 2 decimal places. (2)

$$x=\frac{8\pm\sqrt{64-4(2)(1)}}{4}$$

$$=\frac{8\pm\sqrt{56}}{4}$$

$x=3.87, 0.13$

3. Solve $x+\frac{10}{x}=7$ (2)

$x^2+10=7x$

$x^2-7x+10=0$

$(x-5)(x-2)=0$

$x=5,\ x=2.$

**Question 5 – 12 marks**

1. A coin is tossed three times. How many outcomes are in the sample space? (1)

8

2. A bag contains some marbles. The probability of selecting a blue marble at random from this bag is $\frac{3}{8}$. Which of the following could describe the marbles that are in the bag? (1)

(a) 3 blue, 8 red

(b) 6 blue, 11 red

(c) 3 blue, 4 red, 4 green

(d) 6 blue, 5 red, 5 green

D

3. A die has faces numbered 1 to 6. The die is biased so that the number 6 will appear more often than each of the other numbers. The numbers 1 to 5 are equally likely to occur. The die was rolled 1200 times and it was noted that the 6 appeared 450 times. Which statement is correct? (1)

(a) The probability of rolling the number 5 is expected to be $\frac{1}{7}$.

(b) The number 6 is expected to appear 2 times as often as any other number.

(c) The number 6 is expected to appear 3 times as often as any other number.

(d) The probability of rolling an even number is expected to be equal to the probability of rolling an odd number.

C

4. A fair six-sided die is rolled twice. The number on the upper most face is noted each time.

(4)

i) List all the possible outcomes, using a table, for the two rolls of this die.

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |

(this is enough for the 1 mark)

ii) Find the probability of obtaining,

(a) A double $\frac{1}{6}$

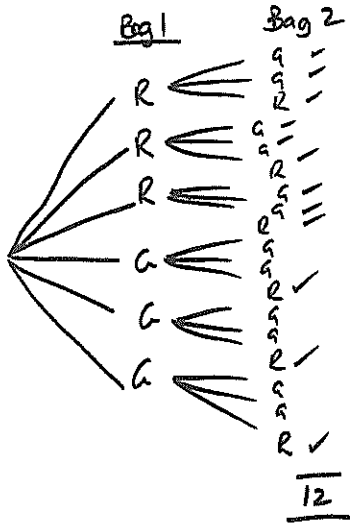
(b) A total of 10 $\frac{3}{36} = \frac{1}{12}$

(c) The number recorded on the first roll being greater than the number recorded on the second roll of the die. $\frac{15}{36}$

5. Two bags sit on the teacher's desk. Each bag contains balls of the same size and shape.
Bag 1 has 3 green balls and 3 red balls, while Bag 2 contains 2 green balls and one red ball.
A ball is chosen at random from each bag and its colour noted.

By using a tree diagram, or otherwise, find the probability of obtaining at least one red ball.

(2)




$\frac{12}{18} = \frac{2}{3}$

OR $1 - P(GG)$

$= 1 - [\frac{1}{2} \times \frac{2}{3}]$

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

$= \frac{2}{3}$.

6. Cecil invited 175 movie critics to preview his new movie. After seeing the movie, he conducted a survey. Cecil has almost completed the two-way table.

| | *Aged <40* | *Aged≥40* | *Totals* |
|---|---|---|---|
| Movie critics who liked the movie | 65 | 55 | 120 |
| Movie critics who did not like the movie | 24 | 31 | 55 |
| Totals | 89 | A 86 | 175 |

(i) Determine the value of A.

86

(1)

(ii) A movie critic is selected at random.
What is the probability that the critic was less than 40 years old and did not like the movie?

$\frac{24}{175}$

(1)

(iii) Cecil believes that his movie will be a box office success if 65% of the critics who were surveyed liked the movie.

Will this movie be considered a box office success? Justify your answer.

120 out of 175 = 68.57%

> 65%

∴ he can consider it a success. (1)

End of Paper