

MA TRẬN ĐỀ HKI TOÁN 10													
STT	Lesson Topics	CÂU HỎI THEO MỨC ĐỘ NHẬN THỨC								Total number of questions	Total number of marks	% of questions	% of marks
		Recognise-5		Fluency-30		Problem Solving-35		Advanced Problem Solving/Reasoning-10					
		question	marks	question	marks	question	marks	question	marks				
1	1A Exponent laws			1	10					1	10	5%	10%
2	8E Operations with radicals							1	5	1	5	5%	5%
3	24C Domain and Range			1	6					1	6	5%	6%
4	12A Business Calculation	1	2							1	2	5%	2%
5	12B Appreciation and depreciation	1	2							1	2	5%	2%
6	12C Simple Interest	1	2	1	6					1.5	8	8%	8%
7	12D Compound Interest	1	2	1	6					1.5	8	8%	8%
8	16D Problem solving					1	10			1	10	5%	10%
9	16E Nonlinear simultaneous equations							1	5	1	5	5%	5%
10	2A-E Algebraic expansion review			1	6					0.5	6	3%	6%
11	2D The binomial expansion	1	2							1	2	5%	2%
12	3A-E algebraic factorisation review			1	6					0.5	6	3%	6%
13	3F Factorisation ax^2+bx+c , $a \neq 1$	1	2			1	10			2	12	11%	12%
14	3G Miscellaneous factorisation	1	2							1	2	5%	2%
15	13A-C Quadratic review	1	2							1	2	5%	2%
16	13D Completing the square	1	2							1	2	5%	2%
17	13E The quadratic formula	1	2							1	2	5%	2%
18	13F Problem solving using quadratics					1	10			1	10	5%	10%
Tổng cộng		10	20	4	40	3	30	2	10	19	100	100%	100%
Tỷ lệ câu		52.63%		21.05%		15.79%		10.53%					
Tỷ lệ điểm		20%		40%		30%		10%					

BẢNG ĐẶC TẢ MA TRẬN TOÁN 10						
STT	ĐƠN VỊ KIẾN THỨC	CHUẨN KIẾN THỨC KỸ NĂNG CẦN KIỂM TRA	CÂU HỎI THEO MỨC ĐỘ NHẬN THỨC			
			NHẬN BIẾT	THÔNG HIỂU	VẬN DỤNG	VẬN DỤNG CAO
1	1A Exponent laws	Thông hiểu: – use Exponent laws to simplify the express		1		
2	8E Operations with radicals	Vận dụng cao: – Operations with radicals				1
3	24C Domain and Range	Thông hiểu: - find the domain and range		1		
4	12A Business Calculation	Nhận biết: - calculate the business problems	1			
5	12B Appreciation and depreciation	Nhận biết: - state the Appreciation and depreciation	1			
6	12C Simple Interest	Nhận biết: - find the simple interest Thông hiểu: - use the first value where the interesr is known	1	1		
7	12D Compound Interest	Nhận biết: - fine the compound interest Thông hiểu: - use the first value where the interesr is known	1	1		
8	16D Problem solving	Vận dụng: - solving the problem with linear modules			1	
9	16E Nonlinear simultaneous equations	Vận dụng cao: - Find the true bearing of a point from a given point				1
10	2A-E Algebraic expansion review	Thông hiểu: - Find algebraic values of obtuse angle		1		
11	2D The bionomial expansion	Nhận biết: - Find the bionomial expansion	1			
12	3A-E algebraic factorisation review	Thông hiểu: - Find the missing factor and side using the algebratic		1		
13	3F Factorisation ax^2+bx+c , a not 1	Nhận biết: - state a, b, c Vận dụng: - state the quadratic function	1		1	
14	3G Misecellaneous factorisation	Nhận biết: - Find the Misecellaneous factorisation	1			
15	13A-C Quadratic review	Nhận biết: - Find the quadratic	1			
16	13D Completing the square	Nhận biết: - solve the quadratic function by Completing the square	1			
17	13E The quadratic formula	Nhận biết: - solve the quadratic function by using quadratic formula	1			
18	13F Problem solving using quadratics	Vận dụng: - solve problem with quadratics			1	

Show your working unless stated otherwise

SECTION 1

70 marks

Question 1. Solve for x

- a. $2x + 1 = 3(x - 3)$ (3 marks) b. $\frac{x + 2}{3} = -5$ (3 marks)
- c. $3^{x+2} = 3^{2x}$ (3 marks) d. $\frac{32}{2^x} = 2^{2x+1}$ (3 marks)

Question 2. Solve the quadratic equations by the given method

- a. $x^2 - 4x = 5$ (4 marks) b. $x^2 - 3x - 10 = 0$ (4 marks)
(Completing the square) (Factorisation)

Question 3. Solve the simultaneous by either algebraic methods

- a. $2(x + 4) + y = 2$ (3 marks) b. $\frac{x}{2} + \frac{y}{5} = 2$ (3 marks)
 $2y - 3x = 2$ $\frac{x}{3} - \frac{y}{5} = 3$

Question 4. Solve the inequality and graph solutions on the number line

- a. $3 - 4x \leq 7$ (3 marks) b. $-5 \leq 3x + 4 < 1$ (3 marks)

Question 5. Simplify the expressions

- a. $3\sqrt{3} - 6\sqrt{5} - 6\sqrt{3}$ (3 marks) b. $\sqrt{45} - 3\sqrt{180} + 3\sqrt{20}$ (3 marks)
- c. $\sqrt{12} \times \frac{10\sqrt{6}}{\sqrt{18}}$ (4 marks) d. $\frac{2}{2 - \sqrt{3}} + \frac{1}{2 + \sqrt{3}}$ (4 marks)

Question 6.

a. Expand and simplify the expression:

$(a - 3)(2a + 5) - 2(a + 2)^2$ i. (4 marks) ii. (4 marks)
 $(a + 2b)^3 - ab(a + b)$

b. Fully factorise the expression:

$(x - 2)^2 - (x + 5)^2$ i. (3 marks) ii. (3 marks)
 $x^3 + 2x^2 + 2x + 4$

Question 7. Simplify the following and express your answers using **positive indices**.

a. $(x^{-2}y^5)(x^3y^{-6})$ (3 marks)

b. $\left(\frac{x^3y^{-3}}{x^2y}\right)^2$ (3 marks)

c. $\sqrt[4]{x^8y^6} \div (xy)^3$ (4 marks)

SECTION 2

25 marks

Question 8. Given the function $y = f(x) = 2^x$

a. Copy and complete the following table (3 marks)

x	-2	-1	0	1	2	3
$y = 2^x$						

b. Write the function $g(x)$ as reflection over y-axis of function $f(x)$. (2 marks)

c. Draw the graphs of function $f(x)$ and $g(x)$ on the same coordinate plane. (4 marks)

d. Write range and domain of function $f(x)$. (2 marks)

Question 9. You bought \$2000 worth of stocks in 2012. The value of the stocks has been decreasing by 10% each year. (4 marks)

a. Write an exponential decay function to represent this situation, where V is the value of stocks each year and t is the number of years.

b. What will your stock be worth in 2017? Round your answer to the nearest cent.

Question 10.

a. The length of a room is 8 m greater than its width. If both the length and the width are increased by 2 m, the area increases by 60 m^2 . Find the dimensions of the room. (5 marks)

b. The second angle of a triangle is twice as large as the first. The measure of the third angle is 20° greater than the first. How large are the angles? (5 marks)

SECTION 3

5 marks

Question 11. Solve the simultaneous equations

$$x^2 + x = 3y$$

$$y^2 + y = 3x$$

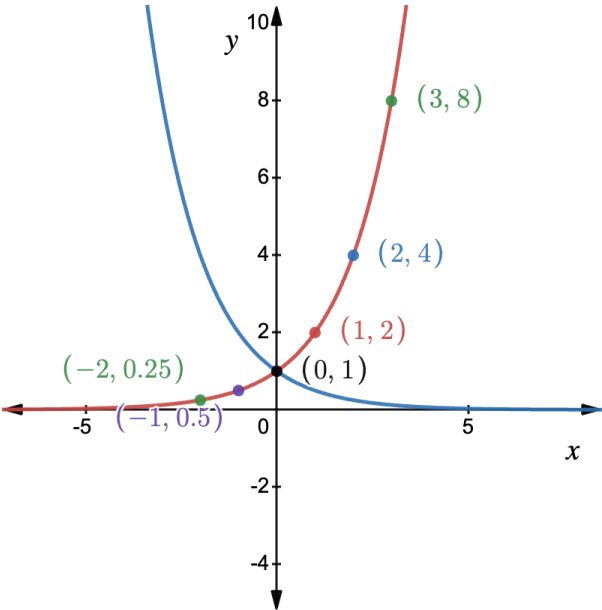
–Hết–

Year 10 - Semester Exam Mark Scheme

Q.no	Scheme	Mark
SECTION 1		
1	a. $2x + 1 = 3(x - 3)$ $2x + 1 = 3x - 9$ $x = 10$	(2) marks (1) mark
	b. $\frac{x + 2}{3} = -5$ $x + 2 = -15$ $x = -17$	(2) marks (1) mark
	c. $3^{x+2} = 3^{2x}$ $x + 2 = 2x$ $x = 2$	(2) marks (1) mark
	d. $\frac{32}{2^x} = 2^{2x+1}$ $2^{5-x} = 2^{2x+1}$ $5 - x = 2x + 1$ $x = \frac{4}{3}$	(1) mark (1) mark (1) mark
2	a. $x^2 - 4x = 5$ $x^2 - 4x + 4 = 9$ $(x - 2)^2 = 3^2$ $x - 2 = 3$ or $x - 2 = -3$ $x = 5$ or $x = -1$ Note: Deduct 1 mark if students use wrong methods	(1) mark (1) mark (0.5)×2 marks (0.5)×2 marks
	b. $x^2 - 3x - 10 = 0$ $x^2 - 5x + 2x - 10 = 0$ $x(x - 5) + 2(x - 5) = 0$ $(x - 5)(x + 2) = 0$ $x = 5$ or $x = -2$ Note: Deduct 1 mark if students use wrong methods	(1) mark (1) mark (1) mark (0.5)×2 marks
3	a.	

		(1) mark
5	a. $3\sqrt{3} - 6\sqrt{5} - 6\sqrt{3}$ $= -3\sqrt{3} - 6\sqrt{5}$	(3) marks
	b. $\sqrt{45} - 3\sqrt{180} + 3\sqrt{20}$ $= \sqrt{9 \times 5} - 3\sqrt{36 \times 5} + 3\sqrt{4 \times 5}$ $= 3\sqrt{5} - 18\sqrt{5} + 6\sqrt{5}$ $= -9\sqrt{5}$	(1) mark (1) mark (1) mark
	c. $\sqrt{12} \times \frac{10\sqrt{6}}{\sqrt{18}}$ $= 2\sqrt{3} \times \frac{10\sqrt{6}}{3\sqrt{2}}$ $= \frac{60\sqrt{2}}{3\sqrt{2}}$ $= 20$	(2) marks (1) mark (1) mark
	d. $\frac{2}{2 - \sqrt{3}} + \frac{1}{2 + \sqrt{3}}$ $= \frac{2(2 + \sqrt{3}) + (2 - \sqrt{3})}{(2 - \sqrt{3})(2 + \sqrt{3})}$ $= \frac{6 + \sqrt{3}}{4 - 3}$ $= 6 + \sqrt{3}$	(1) mark (2) marks (1) mark
6	a. i. $(a - 3)(2a + 5) - 2(a + 2)^2$ $= 2a^2 + 5a - 6a - 15 - 2a^2 - 8a - 8$ $= -9a - 23$ ii. $(a + 2b)^3 - ab(a + b)$ $= a^3 + 6a^2b + 12ab^2 + 8b^3 - a^2b - ab^2$ $= a^3 + 5a^2b + 11ab^2 + 8b^3$	(2) marks (2) marks (2) marks (2) marks
	b.	

	i. $(x - 2)^2 - (x + 5)^2$ $= (x - 2 - x - 5)(x - 2 + x + 5)$ $= -7(2x + 3)$ ii. $x^3 + 2x^2 + 2x + 4$ $= x^2(x + 2) + 2(x + 2)$ $= (x + 2)(x^2 + 2)$	(1) mark (2) marks														
7	a. $(x^{-2}y^5)(x^3y^{-6})$ $= xy^{-1}$ $= \frac{x}{y}$	(1) mark (2) marks														
	b. $\left(\frac{x^3y^{-3}}{x^2y}\right)^2$ $= (xy^{-4})^2$ $= x^2y^{-8}$ $= \frac{x^2}{y^8}$	(1) mark (1) mark (1) mark														
	c. $\sqrt[4]{x^8y^6} \div (xy)^3$ $= x^2y^{\frac{3}{2}} \div (x^3y^3)$ $= x^{-1}y^{\frac{-3}{2}}$ $= \frac{1}{xy^{\frac{3}{2}}}$	(1) mark (1) mark (2) marks														
SECTION 2																
8	a.<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$y = 2^x$</td><td>$\frac{1}{4}$</td><td>$\frac{1}{2}$</td><td>1</td><td>2</td><td>4</td><td>8</td></tr></table>	x	-2	-1	0	1	2	3	$y = 2^x$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8	$(0.5) \times 6$ marks
x	-2	-1	0	1	2	3										
$y = 2^x$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8										

	b. $g(x) = f(-x) = 2^{-x}$	(2) marks
	c.  <i>Note: Deduct 1 mark if students draw graphs in separate coordinate plane</i>	Coordinate plane: (1) mark Points plotting: (1) mark Graph: (2) marks
	d. Domain: $\{x x \in \mathbb{R}\}$ Range: $\{y y > 0\}$	(1) mark (1) mark
9	$V = 2000 \times 0.9^t$	(2) marks
	In year 2017: $V = 2000 \times 0.9^5 = \1180.98	(2) marks
10	a. Let x be the width, then the length is $x + 8$ Equation: $(x + 2)(x + 2 + 8) = x(x + 8) + 60$ $x^2 + 12x + 20 = x^2 + 8x + 60$ $x = 10$ Therefore, the dimensions of the room are 10m width and 18m. <i>Note: Deduct 1 mark if students do not show work to solve the equation.</i>	(1) $\times$ 2 marks (1) mark (1) mark (1) mark

	b. Let x be the first angle. The second angle is twice as large as the first: $2x$ The measure of the third angle is 20° greater than the first: $x + 20$. The sum of the interior angles of a triangle is always 180°: $x + (2x) + (x + 20) = 180$ $x = 40$ The second angle: $2 \times 40^\circ = 80^\circ$ The third angle: $20^\circ + 40^\circ = 60^\circ$ So, the three interior angles of the triangle are 40°, 80°, and 60° Note: Deduct 1 mark if students do not show work to solve the equation.	(1) mark (0.5) mark (0.5) mark (1) mark (1) mark (0.5) mark (0.5) mark
11	$x^2 + x = 3y$ (1) $y^2 + y = 3x$ (2) Subtract: $x^2 - y^2 + x - y = 3y - 3x$ $x^2 - y^2 + 4x - 4y = 0$ $(x - y)(x + y) + 4(x - y) = 0$ $(x - y)(x + y + 4) = 0$ $x - y = 0$ or $x + y + 4 = 0$ $x = y$ or $x = -y - 4$ Substitute $x = y$ into equation (1): $x^2 + x = 3x$ $x^2 - 2x = 0$ $x(x - 2) = 0$ $x = 0$ or $x = 2$ Then $y = x = 0$ or $y = x = 2$ Substitute $x = -y - 4$ into equation (2): $y^2 + y = 3(-y - 4)$ $y^2 + 4y + 12 = 0$ $\Delta = 4^2 - 4 \times 12 = -32 < 0$ (No real solution) Solution (0,0) or (2,2) Note: Deduct 1 mark if students do not show work to solve the equation.	(1) mark (1) mark (1) mark (1) mark