# HKDSE Exam Series — Master 12, Tackle 5

Hot Question Types For Mathematics (Compulsory Part)

New Syllabus Edition

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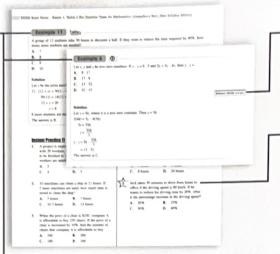




# **Special Features**

#### **Examples**

demonstrate problem solving skills and steps for answering common exam-typed questions in paper 1 and paper 2. Examples marked with and icons are for level 3 and level 4 achievers respectively. MC questions with low rate of correct answers are marked with answers are marked with answers are marked with answers are marked with answers.



#### Reference

clearly lists out questions of similar type in the HKDSE papers.

#### **Instant Practice**

#### **Solving Strategy**

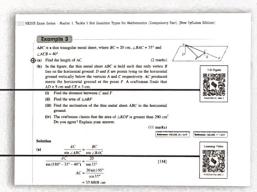
provided on the side of examples suggest problem solving strategies and tips on scoring marks to help candidates answer questions effectively.

#### **MC Shortcut**

suggests shortcut to answer multiple-choice questions and enhance the effectiveness and confidence of candidates.

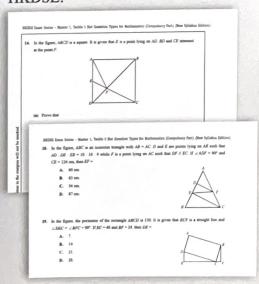
For some questions, there are online **Learning Videos** and **3-D** 

**Figures** drawn by GeoGebra. Candidates can access via the QR codes given.



#### **Mock Exam**

are provided for final revision before HKDSE.



#### **Solution Guide**

(access via QR codes) clearly shows the detailed steps and marking scheme of each question.

		24	Constitute Geometr
24 Coordinate Geomet	ev II	A. (a) yearin is a sargent to C.	
24 Coordinate Geomet	ty II	- Radius of C = 9	[IM]
		Equation of C to	
Conventional Questions		$(x - \theta)^2 + (y - 4)^2 = \theta^2$	
Instant Practice I		$(x - 0)^2 + (y - 4)^2 = 0.1$	[1A]
<ol> <li>(a) a-axis is a tangent to C</li> </ol>		(b) Equation of L is	
— Radius of C ≈ 2	[IM]	y= -1 x + 4	[100]
Equation of C is			11.00
$(x - 2)^t + (y - 2)^t = 2^t$		z + 3y = 34(1)	
$(x-5)^2 + (y-2)^2 = 4$	[1A]	Let L' be the stenight line pussing mid-prims of Ad and the centre of	
(h) Equation of L is		E is personalization to L.	
p = 3a + 4	[1M]	Gine printing country to mad-pr. of	Overda I bread
3a - y = -4(1)		○ Slow of L = 3	and a manny
Let C be the straight line passing through the mul-point of AH and the course of C		Equation of E is	
L' n perpendicular to L.		2 - 4 = 3(4 - 9)	DMD
E. to perpendicular to L.  (See institut country to said as, of chard L chard)		3a - r = 23 (2)	1,000
	-	On solving (1) and (2),	DMI
i. Stope of $E = \frac{-1}{3}$		the coordinates of the mist-project	of All are
Equation of E in		M+69 94 - 21	E143 - E-44
$y = 2 = \frac{-1}{2}(x - 5)$	HMG	10 10	[iA] + [iA]
1	11.000		
x + 3y = 13 (2)		4. Init y-axis is a tangent to C.	
On solving (1) and (2),	(IM)	Ratine of C = 6	[1M]
the coordinates of the mal-point of Alf are		Equation of C is	
(11-34 , 11+4)	[A] + [IA]	$[x-(-6)]^2 + [x-(-2)]^2 = \mathbf{h}^2$	
(10 14 /		$(x+6)^2 + (x+2)^2 = 36$	[IA]
2. (a) a-exis in a sergent to C		(b) Equation of L is	
. Ballo of C e B	[194]	> = 1/2 x + 4	[(M)
Equation of C is	11967		
(a - 1) * (a - 1-4) * * 8'		1-20=-28(1)	
14 - 17 - 11 + 17 - 14	[1A]	Let $L$ be the straight line passing through the mai-grant of $Ad$ and the course of $C$	
(b) Equation of L is	11.61	E is personalicated to L.	
en le e à	(IMI)	E in perpensional to C.  One person count to end as of chord L chards	
is-sed(i)	(1,00)	Since of 6 m -2	

#### **HKDSE Training Plan**

provides a clear goal for candidates and increase the effectiveness on revision.

	HKDSE Training Plan -		
hove	g for Level 2: The following table lists the common question ty in the HEDHE. After revising the topics, condidates can put a	pen that combidates about a russ of its the provided for prog	ter for achieving Lovel 2 perm checking,
	Topics	Examples for Reference	
- April		Paper 1	Paper 2
Section A	1. Levs of Indices	□ 1-3·	□ 4-7·
	2. Fermulas	☐ 1-5·	☐ 6-12 ·
	3. Percentages	1-5*	_ 6-10 °
	4. Appreximation and lime	□ 1-2	☐ 3-5°
	5. Polysomala	1-4*	_ 9-11 °
	6. Equations	1-5*	□ 687°
	7. Panetons and Graphs	(Not applicable)	1-3,7-8°
	8. Inequalities	□ 1-3·	☐ 4-6°
	9. Rest, Ratio and Proportion	1-3	□ 5-18*
	10. Variations	□ 1-1·	6-70
	11 Messagement	□ 1-1*	9.14-17
	12. Barri Grandly	1-2	9-10
	15. Trigonomory I	(Not applicable)	□ 2-4
	14. Coordinate Connectity	□ 1-2	□ 4-7
	13. Pedahicry	□ 1-3	[] 1-6
	14. Measures of Control Dandency and Dispersion	□ 1*	□ 41

# Content

#### **Section A**

- 1. Laws of Indices
- 2. Formulas
- 3. Percentages
- 4. Approximation and Error
- 5. Polynomials
- 6. Equations
- 7. Functions and Graphs
- 8. Inequalities
- 9. Rate, Ratio and Proportion
- 10. Variations
- 11. Mensuration
- 12. Basic Geometry
- 13. Trigonometry I
- 14. Coordinate Geometry
- 15. Probability
- 16. Measures of Central Tendency and Dispersion

### **Section B**

- 17. More about Polynomials
- 18. Numbers and Logarithms
- 19. Sequences
- 20. More about Quadratic Equations
- 21. Transformations of Functions
- 22. More about Inequalities and Linear Programming
- 23. Basic Properties of Circles
- 24. Coordinate Geometry II
- 25. Trigonometry II
- 26. More about Probability
- 27. More about Statistics

**Mock Exam** 

**HKDSE Training Plan** 

**Answers** 

**QR** Codes for Solution Guide

# Laws of Indices

#### **Conventional Questions**

#### Section A(1)

## Example 1



Simplify  $(\alpha^2 \beta)(\alpha \beta^{-3})^5$  and express your answer with positive indices.

(3 marks)

<del>ուղուդուդուդուդուդուդուդուդուդուդ</del> **Reference:** HKDSE 21 I Q1

#### **Solution**

$$(\alpha^2\beta)(\alpha\beta^{-3})^5$$

$$= (\alpha^2 \beta)(\alpha^5 \beta^{-15})$$

$$= \alpha^7 \beta^{-14}$$

$$=\frac{\alpha^7}{\beta^{14}}$$

[1M]

#### **Instant Practice 1**

Simplify each of the following and express your answers with positive indices.

1. 
$$(\alpha^2 \beta^{-3})(\alpha^{-1} \beta^2)^4$$

(3 marks)

2. 
$$(x^{-2}y)(xy^{-2})^7$$

(3 marks)

3. 
$$\frac{1}{(c^2d^3)(d^{-7}c)^4}$$

(3 marks)

4. 
$$\frac{1}{(x^4y^8)(x^{-3}y^{-1})^4}$$

(3 marks)

$$5. \quad \frac{xy^2}{(x^3y^{-2})(x^4y^{-2})^2}$$

(3 marks)

# Example 2 - 3



Simplify  $\frac{(x^5y^{-2})^3}{v^4}$  and express your answer with positive indices.

(3 marks)

Reference: HKDSE 20 I Q1

Reference: HKDSE 15 I Q1

Reference: HKDSE 141 QI

Solution

$$\frac{(x^{5}y^{-2})^{3}}{y^{4}} = \frac{x^{15}y^{-6}}{y^{4}}$$
$$= \frac{x^{15}}{y^{4-(-6)}}$$

[1A]

# **Instant Practice 2**

Simplify each of the following and express your answers with positive indices.

1. 
$$\frac{(x^{-2}y^5)^3}{x^4}$$

(3 marks)

$$2. \quad \frac{(x^{-1}y^{-2})^3}{x^{-5}}$$

(3 marks)

3. 
$$\frac{m^3}{(mn^{-3})^2}$$

(3 marks)

4. 
$$\frac{p^{-9}}{(p^3q^{-2})^5}$$

(3 marks)

5. 
$$\frac{p^{-3}}{(p^{-1}q^3)^{-2}}$$

(3 marks)

## Example 3 - 3



Simplify  $\frac{a^{10}b^8}{(a^2b^{-3})^4}$  and express your answer with positive indices.

(3 marks)

Reference: HKDSE 23 I Q2

Reference: HKDSE 22 I Q1

Reference: HKDSE 18 I Q2

Reference: HKDSE 17 I Q2

#### Solution

$$\frac{a^{10}b^8}{(a^2b^{-3})^4} = \frac{a^{10}b^8}{a^8b^{-12}}$$
$$= a^{10-8}b^{8-(-12)}$$
$$= a^2b^{20}$$

#### **Instant Practice 3**

Simplify each of the following and express your answers with positive indices.

1. 
$$\frac{m^2n^6}{(m^5n^{-2})^3}$$

(3 marks)

$$2. \quad \frac{m^{-3}n^6}{(m^5n^{-2})^{-3}}$$

(3 marks)

$$3. \quad \frac{(x^3y^{-1})^2}{x^7y^{-6}}$$

(3 marks)

4. 
$$\frac{(mn^{-5})^2}{(m^{-3})^4}$$

(3 marks)

$$5. \quad \frac{(xy^{-4})^{-3}}{(x^4y^{-2})^5}$$

(3 marks)

# **Multiple-choice Questions**

#### Section A

# Example 4 3



$$\frac{(5x^3)^4}{25x^{10}} =$$

**A.** 
$$\frac{x^2}{5}$$
.

**B.** 
$$\frac{4x^2}{5}$$
.

C. 
$$25x^2$$
.

**D.** 
$$\frac{25}{x^7}$$
.

Reference: HKDSE 20 II Q1

Reference: HKDSE 19 II Q2

Solution

$$\frac{(5x^3)^4}{25x^{10}} = \frac{5^4 x^{12}}{5^2 x^{10}}$$
$$= 5^2 x^2$$
$$= 25x^2$$

The answer is C.

# **MC Shortcut**

Strategy - Substituting Values into Unknowns

Substitute x = 2 into the expression and use a calculator to find the correct option.

#### **Instant Practice 4**

1. 
$$\frac{(2x^5)^3}{6x^7} =$$

**A.** x. **B.** 
$$\frac{4x}{3}$$
.

C. 
$$x^{8}$$
.

**D.** 
$$\frac{4x^8}{3}$$
.

$$2. \quad \frac{(2^2 x^5)^3}{16 x^{-2}} =$$

**A.** 
$$4x^{17}$$
.

**B.** 
$$4x^{10}$$
.

C. 
$$2x^{17}$$
.

**D.** 
$$2x^{10}$$
.

$$3. \quad \frac{9x^6}{(3x^2)^4} =$$

**A.** 
$$\frac{3}{4}$$
.

**B.** 
$$\frac{x^2}{9}$$
.

C. 
$$\frac{1}{9x^2}$$
.

**D.** 
$$\frac{3}{r^2}$$

$$4. \quad \frac{(5x^2)^{-3}}{5x^{-7}} =$$

**B.** 
$$\frac{x}{625}$$
.

C. 
$$\frac{1}{125x}$$
.

**D.** 
$$\frac{1}{625x}$$
.

$$5. \quad \frac{(3x^{-7})^2}{27x^9} =$$

A. 
$$\frac{2}{9r^{23}}$$
.

**B.** 
$$\frac{2}{9x^5}$$
.

C. 
$$\frac{1}{3x^{23}}$$
.

**D.** 
$$\frac{1}{3x^5}$$
.