Name

Class

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Indices (9 – 1) Topic booklet

HIGHER

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

•Use **black** ink or ball-point pen.

•Fill in the boxes at the top of this page with your name, centre number and candidate number.

- •Answer all questions.
- Answer the questions in the spaces provided
- there may be more space than you need.

•Diagrams are NOT accurately drawn, unless otherwise indicated.

•You must show all your working out.

•If the question is a **1F** question you are not allowed to use a calculator.

•If the question is a 2F or a 3F question, you may use a calculator to help you answer.

Information

•The marks for each question are shown in brackets

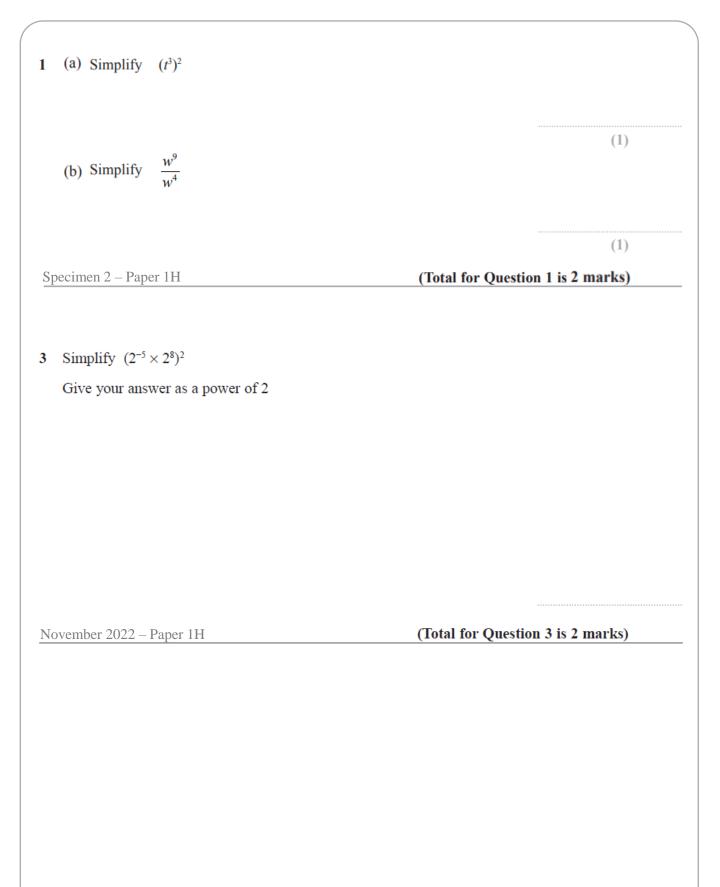
- use this as a guide as to how much time to spend on each question.

Advice

- •Read each question carefully before you start to answer it.
- •Keep an eye on the time.
- •Try to answer every question.
- •Check your answers if you have time at the end.

1 (a) Simplify $(x^3)^5$ June 2022 – Paper 2H (Total for Question 1 is 1 (a) Simplify $n^3 \times n^5$ (b) Simplify $\frac{c^3d^4}{c^2d}$	Answer ALL questions Write your answers in the space provided. You must write down all the stages in your working.		
1 (a) Simplify $n^3 \times n^5$			
1 (a) Simplify $n^3 \times n^5$	(1)		
	5 marks)		
(b) Simplify $\frac{c^3d^4}{c^2d}$			
	(1)		
	(2)		
November 2020 – Paper 3H (Total for Question 1 is	s 3 marks)		

1 Work out the value of $\frac{3^7 \times 3^{-2}}{3^3}$	
November 2018 – Paper 1H	(Total for Question 1 is 2 marks)
1 (a) Simplify $m^3 \times m^4$	
(b) Simplify $(5np^3)^3$	(1)
(c) Simplify $\frac{32q^9r^4}{4q^3r}$	(2)
June 2018 – Paper 2H	(2) (Total for Question 1 is 5 marks)
	3



Specimen 2 – Paper 2H

(Total for Question 3 is 1 mark)

x =

y =

(1)

(1)

- **6** $p^3 \times p^x = p^9$
 - (a) Find the value of x.

 $(7^2)^y = 7^{10}$

(b) Find the value of y.

 $100^{a} \times 1000^{b}$ can be written in the form 10^{w}

(c) Show that w = 2a + 3b

(2)

November 2017 – Paper 2H

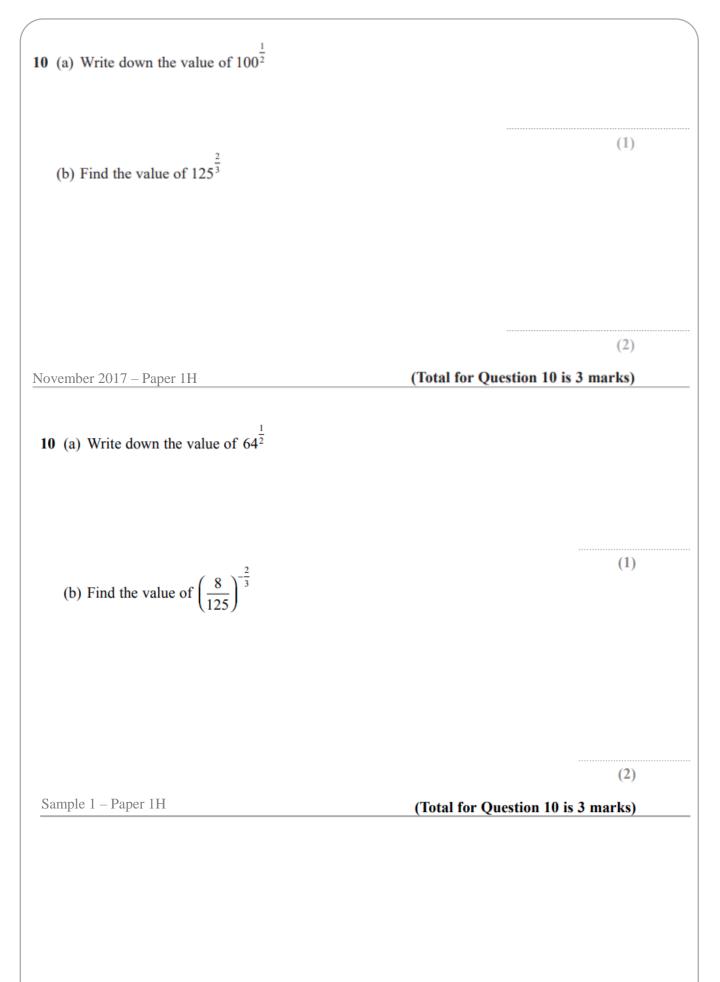
(Total for Question 6 is 4 marks)

8 (a) Work out an estimate for the value of $$	63.5 × 101.7	
	(2)	
$(2.3)^6 = 148$ correct to 3 significant figures.		
(b) Find the value of $(0.23)^6$ correct to 3 sign	nificant figures.	
	(1)	
	(1)	
(c) Find the value of 5 ⁻²		
	(1)	
une 2019 – Paper 1H	(Total for Question 8 is 4 marks)	
·		

une 2022 – Paper 3H	(1) (Total for Question 9 is 4 marks)
(b) Explain why.	
Liam's method is wrong.	
Liam wrote $(12^{50})^2 = 12^{50^2} = 12^{2500}$	
Liam was asked to express $(12^{50})^2$ as a power of 12	
	(3)
(a) Express $\sqrt{\frac{10^{360}}{10^{150} \times 10^{90}}}$ as a power of 10	
10360	

9 (a) Write down the value of 7^0	
(b) Find the value of $3 \times 3^6 \times 3^{-6}$	(1)
(c) Find the value of 2 ⁻⁴	(1)
(d) Find the value of $27^{\frac{1}{3}}$	(1)
November 2021 – Paper 1H	(1) (Total for Question 9 is 4 marks)

9
$$\frac{y^4 \times y^*}{y^2} = y^{-3}$$
Find the value of *n*.
(2)
November 2018 – Paper 3H
(Total for Question 9 is 8 marks)
(3)
(a) Write down the value of 36 ^{$\frac{1}{2}$}
(b) Write down the value of 23⁹
(c)
(c) Work out the value of 27 ^{$-\frac{2}{3}$}
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(c) Work out the value of 27 ^{$-\frac{2}{3}$}
(c)



II (a) Find the value of
$$\sqrt[3]{81 \times 10^3}$$

 (b) Find the value of $64^{-\frac{1}{2}}$

 (c)

 (c) Write $\frac{3^n}{g^{n-1}}$ as a power of 3

 (c)

 (

11 Write down the value of $125^{\frac{2}{3}}$

Specimen 1 – Paper 1H

(Total for Question 11 is 1 mark)

12 $(ax^6)^{\frac{1}{n}} = 7x^3$

Work out the value of *a* and the value of *n*.

a =

n =

November 2021 – Paper 3H

(Total for Question 12 is 2 marks)

12 Patrick has to work out the exact value of
$$64^{\frac{1}{4}}$$

Patrick says,
 $\frac{1}{4} e^{1} 64 is 16 so $64^{\frac{1}{4}} = 16^{\circ}$
Explain what is wrong with what Patrick says.

June 2019 – Paper 3H (Total for Question 12 is 1 mark)
12 (a) Find the value of $81^{\frac{1}{2}}$
(b) Find the value of $81^{\frac{1}{2}}$
(c)
May 2017 – Paper 1H (Total for Question 12 is 4 marks)$

14 Simplify fully
$$(3x^2y^6)^4$$

(2)

November 2022 - Paper 3H

(Total for Question 14 is 2 marks)

14 (a) Work out the value of $\left(\frac{16}{81}\right)^{\frac{3}{2}}$

(2)

 $3^a = \frac{1}{9}$
 $3^b = 9\sqrt{3}$
 $3^c = \frac{1}{\sqrt{3}}$

(b) Work out the value of $a + b + c$

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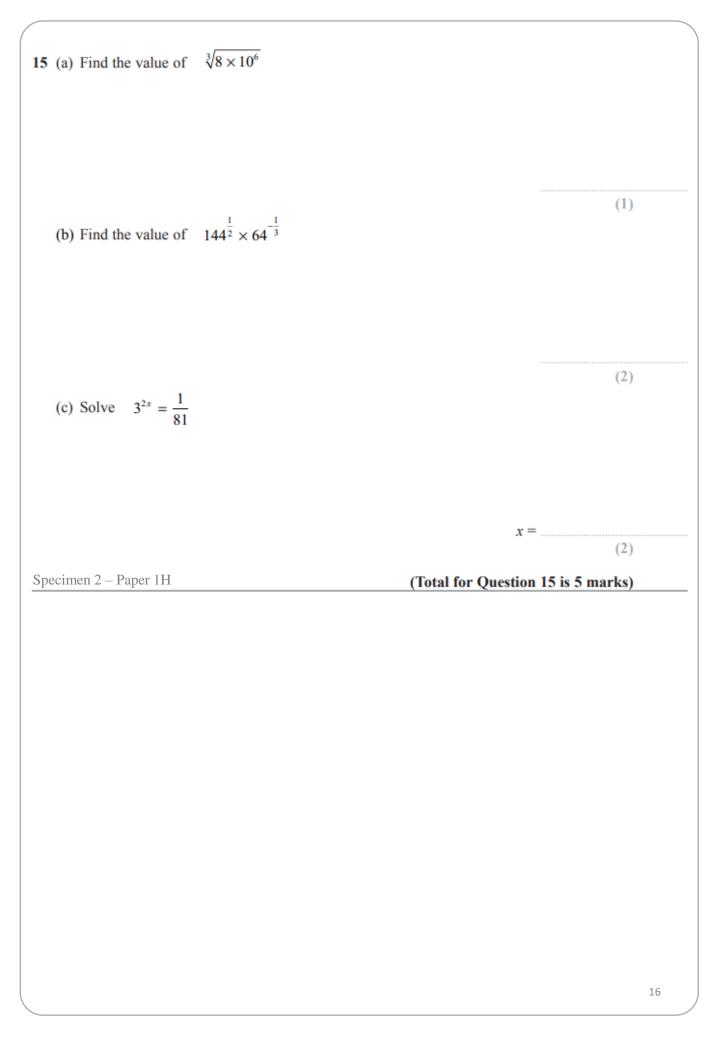
(9)

(9)

17 Work out the value of $\left(\frac{8}{27}\right)^{\frac{4}{3}}$

November 2022 – Paper 1H

(Total for Question 17 is 2 marks)



18 Work out the value of
$$\frac{\left(5\frac{4}{9}\right)^{-\frac{1}{2}} \times \left(4\frac{2}{3}\right)}{2^{-3}}$$

You must show all your working.

June 2022 – Paper 1H

(Total for Question 18 is 4 marks)

18 $16^{\frac{1}{5}} \times 2^{x} = 8^{\frac{3}{4}}$

Work out the exact value of *x*.

June 2017 – Paper 2H

(Total for Question 18 is 3 marks)

9 Given that $9^{-\frac{1}{2}} =$	1					
\mathbf{y} Orven that $\mathbf{y} = -$	$27^{\frac{1}{4}} \div 2^{x+1}$					
find the exact valu	$27 \div 5$					
	1001 x.					
					<i>x</i> =	
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