

Name

Class

# MATHS TEACHER HUB

www.MathsTeacherHub.com

## 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.

**Answer ALL questions**  
**Write your answers in the space provided.**  
**You must write down all the stages in your working.**

1 (a) Simplify  $(x^3)^5$

.....  
(1)

June 2022 – Paper 2H

**(Total for Question 1 is 5 marks)**

---

1 (a) Simplify  $n^3 \times n^5$

.....  
(1)

(b) Simplify  $\frac{c^3d^4}{c^2d}$

.....  
(2)

November 2020 – Paper 3H

**(Total for Question 1 is 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  $m^3 \times m^4$

(1)

(b) Simplify  $(5np^3)^3$

(2)

(c) Simplify  $\frac{32q^9r^4}{4q^3r}$

(2)

June 2018 – Paper 2H

(Total for Question 1 is 5 marks)

1 (a) Simplify  $(t^3)^2$

.....  
(1)

(b) Simplify  $\frac{w^9}{w^4}$

.....  
(1)

Specimen 2 – Paper 1H

**(Total for Question 1 is 2 marks)**

---

3 Simplify  $(2^{-5} \times 2^8)^2$

Give your answer as a power of 2

.....  
November 2022 – Paper 1H

**(Total for Question 3 is 2 marks)**

---

3 Simplify  $5u^2w^4 \times 7uw^3$

Specimen 2 – Paper 2H

(Total for Question 3 is 1 mark)

6  $p^3 \times p^x = p^9$

(a) Find the value of  $x$ .

$x =$  .....  
(1)

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

(b) Find the value of  $y$ .

$y =$  .....  
(1)

$100^a \times 1000^b$  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  $\sqrt{63.5 \times 101.7}$

.....  
(2)

$(2.3)^6 = 148$  correct to 3 significant figures.

(b) Find the value of  $(0.23)^6$  correct to 3 significant figures.

.....  
(1)

(c) Find the value of  $5^{-2}$

.....  
(1)

9 (a) Express  $\sqrt{\frac{10^{360}}{10^{150} \times 10^{90}}}$  as a power of 10

.....  
(3)

Liam was asked to express  $(12^{50})^2$  as a power of 12

Liam wrote  $(12^{50})^2 = 12^{50^2} = 12^{2500}$

Liam's method is wrong.

(b) Explain why.

.....  
.....  
.....  
(1)

9 (a) Write down the value of  $7^0$

.....  
(1)

(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)



**9**

$$\frac{y^4 \times y^n}{y^2} = y^{-3}$$

Find the value of  $n$ .

.....  
(2)

November 2018 – Paper 3H

**(Total for Question 9 is 8 marks)**

**9** (a) Write down the value of  $36^{\frac{1}{2}}$

.....  
(1)

(b) Write down the value of  $23^0$

.....  
(1)

(c) Work out the value of  $27^{-\frac{2}{3}}$

.....  
(2)

June 2018 – Paper 1H

**(Total for Question 9 is 4 marks)**

**10 (a)** Write down the value of  $100^{\frac{1}{2}}$

.....  
(1)

**(b)** Find the value of  $125^{\frac{2}{3}}$

.....  
(2)

November 2017 – Paper 1H

**(Total for Question 10 is 3 marks)**

---

**10 (a)** Write down the value of  $64^{\frac{1}{2}}$

.....  
(1)

**(b)** Find the value of  $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

.....  
(2)

Sample 1 – Paper 1H

**(Total for Question 10 is 3 marks)**

---

11 (a) Find the value of  $\sqrt[4]{81 \times 10^8}$

.....  
(2)

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

.....  
(2)

(c) Write  $\frac{3^n}{9^{n-1}}$  as a power of 3

.....  
(2)

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,

“ $\frac{1}{4}$  of 64 is 16 so  $64^{\frac{1}{4}} = 16$ ”

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  $\left(\frac{64}{125}\right)^{\frac{2}{3}}$

.....  
(2)

.....  
(2)

May 2017 – Paper 1H

**(Total for Question 12 is 4 marks)**

14 Simplify fully  $(3x^5y^6)^4$

.....  
(2)

November 2022 – Paper 3H

**(Total for Question 14 is 2 marks)**

14 (a) Work out the value of  $\left(\frac{16}{81}\right)^{\frac{3}{4}}$

.....  
(2)

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

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

.....  
(2)

November 2018 – Paper 1H

**(Total for Question 14 is 4 marks)**

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)**

15 (a) Find the value of  $\sqrt[3]{8 \times 10^6}$

.....  
(1)

(b) Find the value of  $144^{\frac{1}{2}} \times 64^{-\frac{1}{3}}$

.....  
(2)

(c) Solve  $3^{2x} = \frac{1}{81}$

$x =$  .....  
(2)



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.

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

Work out the exact value of  $x$ .

- 19** Given that  $9^{-\frac{1}{2}} = 27^{\frac{1}{4}} \div 3^{x+1}$   
find the exact value of  $x$ .

$x = \dots\dots\dots$

November 2019 – Paper 1H

**(Total for Question 19 is 3 marks)**

---

- 20** Here is a list of five numbers.

$98^{53}$

$98^{64}$

$98^{73}$

$98^{88}$

$98^{91}$

Find the lowest common multiple of these five numbers.

November 2020 – Paper 3H

**(Total for Question 20 is 1 mark)**

---