## **Indices worksheet**

1 (a) Simplify.

$$(x^2)^3$$

**(b)** 
$$t^{-2} = 9$$

Find the value of *t*.

$$t = \dots$$
 [1]

$$(c) \sqrt{5} \times 5^0 = 5^k$$

Find the value of k.

$$k = \dots$$
 [1]

			( - \)2
2	(a)	Evaluate	$(\sqrt{9} \times \sqrt[3]{64})^2$ .

.....[2]

**(b)** Simplify 
$$\left(\frac{16}{x^6}\right)^{-\frac{1}{2}}$$
.

.....[2]

(c) The table shows the number of tourists and the total tourist spending for some countries in 2016.

Country	Number of tourists	Total spending in dollars
China	5.93×10 <sup>7</sup>	$4.44 \times 10^{10}$
India	$1.46 \times 10^{7}$	$2.31 \times 10^{10}$
Kenya	$1.27 \times 10^6$	1.62×10 <sup>9</sup>
Madagascar	2.93×10 <sup>5</sup>	9.13×10 <sup>5</sup>

(i) Calculate how many more tourists visited India than Kenya in 2016. Give your answer in standard form.

.....[1]

(ii) Calculate the average amount spent per tourist in China in 2016. Give your answer correct to the nearest dollar.

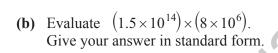
(iii)	From 2014 to 2	2016, the total amount spent by	y tourists in Madagascar increased by 23.5%.	
	Calculate the a	mount spent by tourists in Ma	dagascar in 2014.	
			\$	[2]
(a)	Solve.			
	$27^k = 9$			
			CC	
		20	k =	[2]
(b)	Simplify.	(0)	<i>κ</i> –	[∠ <sub>-</sub>
	$\left(\frac{16}{x^8}\right)^{-\frac{1}{4}}$			
				[2]

**4** (a) 
$$(y^k)^{-2} = y^5$$

Find the value of *k*.

**(b)** Simplify 
$$\left(\frac{x^{\frac{1}{3}}}{2x}\right)^3$$
.

$$k = \dots$$
 [1]



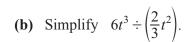
(c) Simplify 
$$\frac{6t^2v^3}{5} \div \frac{3t^2}{v^2}.$$



(d)	$7 \times 10^a - 3 \times 10^{a-1} = k \times 10^a$
	Find <i>k</i> .

$k = \dots$
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**6** (a) Simplify  $(2x^2)^3$ .







(b)	The population density of a country is the number of people per square kilometre.			
	In 2017, the population of Indonesia was $2.62 \times 10^8$ , correct to 3 significant figures. The area of Indonesia is $2 \times 10^6  \text{km}^2$ , correct to 1 significant figure.			
	Calculate an estimate for the population density of Indonesia.			
	manula/lrm² [2]			
0	people/km <sup>2</sup> [2]			
8	Simplify. <b>(a)</b> $(2x^2)^0$			
	<b>(b)</b> $(3x^3)^2$			
	(b) (3x)			
	[1]			
	(c) $\left(\frac{8}{x^3}\right)^{-\frac{1}{3}}$			

.....[2]

	(b)	Giving your answer in standard form, evaluate $\frac{2.4 \times 10^{-8}}{4 \times 10^{-3}}$ .	[1]
10	(a)	Write these numbers in order of size, starting with the smallest. $2.1\times10^{-3} \qquad 4.2\times10^{-4} \qquad 1.7\times10^{-5} \qquad 3.5\times10^{-4}$	[2]
	(b)	smallest $P = 6 \times 10^{10} \qquad Q = 5 \times 10^9$ Evaluate the following. Give each answer in standard form. (i) $P-Q$	[1]

(a) Express  $4500 \times 1000^2$  in standard form.

9

	(ii)	PQ					
11	Sim	plify. $\left(\frac{9x^7y}{x^5y^9}\right)^{-\frac{1}{2}}$					[1]
12		uate the follow $p \times q$	p = ving, giving your	$= 8 \times 10^{-6}$ answers in sta		3	[2]
	(b)	$p \div q$		300	Answer		[1]
	(c)	$\sqrt[3]{p}$			Answer		[1]
					Answer		[1]

	(b)	Find $n$ , where $4^n = 2^{n-1}$ .	Answer[1]
14		$N = 2 \times 10^8$	Answer $n = \dots [2]$
	(a)	Giving your answers in standard form, find the value of (i) $N \times 700$ , (ii) $\frac{1}{N}$ .	Answer[1]
			<i>Answer</i> [2]

**13** (a) Evaluate  $9^1 + 9^0$ .

1	5
	7

 $a^x = 5$ 

(a)	Find	$a^{2x}$	
(a)	rina	$a^{-}$	

*Answer* ......[1]

**(b)** Find  $a^{-x}$ .

*Answer* ......[1]

**16 (a)** Write the number 360 million in standard form.

Answer .....[1

**(b)**  $p = 5 \times 10^9$ 

 $q = 9 \times 10^{-16}$ 

Expressing each answer in standard form, find

(i)  $p \times q$ ,

*Answer* ......[1]

(ii)  $\sqrt{q}$ .

*Answer* ......[1]