INDICES PAST PAPER QUESTIONS

1)

Simplify

$$k^8 \times (k^2)^{-3}.$$

✓	①	$a^m \times a^n = a^{m+n}$
	②	$a^m \div a^n = a^{m-n}$
✓	③	$(a^m)^n = a^{mn}$ & $(a^p b^q)^r = a^{pr} b^{qr}$
	④	$a^0 = 1$
	⑤	$a^{-m} = \frac{1}{a^m}$
	⑥	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

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

$$= k^8 \times k^{-6} \checkmark$$

$$= k^2 \checkmark$$

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2)

Evaluate

$$16^{\frac{3}{4}}.$$

$$16^{\frac{3}{4}}$$

$$= \sqrt[4]{16}^{\,3} \quad \checkmark$$

$$= 2^{3}$$

$$= 8 \quad \checkmark$$

2

①	$a^m \times a^n = a^{m+n}$
②	$a^m \div a^n = a^{m-n}$
③	$(a^m)^n = a^{mn} \quad \& \quad (a^p b^q)^r = a^{pr} b^{qr}$
④	$a^0 = 1$
⑤	$a^{-m} = \frac{1}{a^m}$
⑥	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

$\checkmark$ ⑥

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3)

Express $a^2(2a^{-\frac{1}{2}} + a)$ in its simplest form.

$$a^2\left(2a^{-\frac{1}{2}} + a\right)$$

$$= 2a^{\frac{3}{2}} + a^3$$

✓ ① $a^m \times a^n = a^{m+n}$

② $a^m \div a^n = a^{m-n}$ **2**

③ $(a^m)^n = a^{mn}$ & $(a^p b^q)^r = a^{pr} b^{qr}$

④ $a^0 = 1$

⑤ $a^{-m} = \frac{1}{a^m}$

⑥ $a^{\frac{m}{n}} = \sqrt[n]{a^m}$

$$2 + \left(-\frac{1}{2}\right) = 2 - \frac{1}{2} = 1\frac{1}{2} = \frac{3}{2}$$

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4)

Simplify

$$6x^{\frac{3}{2}} \div 2x^{\frac{1}{2}}$$

①	$a^m \times a^n = a^{m+n}$	
②	$a^m \div a^n = a^{m-n}$	**2**
③	$(a^m)^n = a^{mn}$ & $(a^p b^q)^r = a^{pr} b^{qr}$	
④	$a^0 = 1$	
⑤	$a^{-m} = \frac{1}{a^m}$	
⑥	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$	

$$6x^{\frac{3}{2}} \div 2x^{\frac{1}{2}}$$

$$= 3x^{\frac{2}{2}}$$

$$\frac{3}{2} - \frac{1}{2} = \frac{2}{2} = 1$$

$$= 3x$$

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5)

Express

$$a^{\frac{2}{3}}\left(a^{\frac{2}{3}} - a^{-\frac{2}{3}}\right)$$

in its simplest form.

✓ ①	$a^m \times a^n = a^{m+n}$	
②	$a^m \div a^n = a^{m-n}$	
③	$(a^m)^n = a^{mn}$ & $(a^p b^q)^r = a^{pr} b^{qr}$	
✓ ④	$a^0 = 1$	**2**
⑤	$a^{-m} = \frac{1}{a^m}$	
⑥	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$	

$$a^{\frac{2}{3}}\left(a^{\frac{2}{3}} - a^{-\frac{2}{3}}\right)$$

$$= a^{\frac{4}{3}} - a^0$$

$$= a^{\frac{4}{3}} - 1 \checkmark \quad \checkmark$$

$$\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$$

$$\frac{2}{3} + \left(-\frac{2}{3}\right) = \frac{2}{3} - \frac{2}{3} = 0$$

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6)

Simplify $\dfrac{3a^5 \times 2a}{a^2}$

$$\frac{3a^5 \times 2a}{a^2}$$

$$= \frac{6a^6}{a^2}$$

$$= 6a^4$$

✓① $a^m \times a^n = a^{m+n}$

✓② $a^m \div a^n = a^{m-n}$

3

③ $(a^m)^n = a^{mn}$ & $(a^p b^q)^r = a^{pr} b^{qr}$

④ $a^0 = 1$

⑤ $a^{-m} = \dfrac{1}{a^m}$

⑥ $a^{\frac{m}{n}} = \sqrt[n]{a^m}$

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7)

Simplify the expression below, giving your answer with a positive power.

$$m^5 \times m^{-8}$$

$$m^5 \times m^{-8}$$

$$= m^{-3}$$

$$= \frac{1}{m^3}$$

$5 + (-8)$
$= 5 - 8$
$= -3$

① $a^m \times a^n = a^{m+n}$

② $a^m \div a^n = a^{m-n}$

③ $(a^m)^n = a^{mn}$ & $(a^p b^q)^r = a^{pr} b^{qr}$

④ $a^0 = 1$

⑤ $a^{-m} = \frac{1}{a^m}$

⑥ $a^{\frac{m}{n}} = \sqrt[n]{a^m}$