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MathsNet : A-Level+

Stoke Newington School

Your account expires on: **6 Apr, 2013**

Indices - Exam questions

Syllabus: **EdExcel** Questions: **10** Time: **44 minutes** Total Marks: **35**

This paper contains a set of questions followed by the corresponding mark schemes. The time you should spend on each question together with its worth in marks is also given. The content of this paper is based on material from a wide selection of national and international examination boards and organisations.

You are advised to have:
a set of geometrical equipment, pen, HB pencil, eraser. Check if you are allowed a calculator. Some examinations, but not all, allow calculators, including graphical models.

NOTES: The following browsers have been tested with this facility: Mozilla Firefox 3.x, 4.x; Microsoft Internet Explorer versions 6, 7, 8 and 9 RC (see the website for the small font problem with IE7 and IE8 was tested in IE7 compatibility mode), Apple Safari and Google Chrome. Best results are when the background printing of images and colours is enabled (not available in Chrome on Windows/Mac or Safari on Windows). There are known printing format issues with the Opera web browser and we do not recommend using this browser.

Many of the questions use the jsMath applet. This requires special fonts to be installed for successful printing. These fonts can be downloaded from: **http://www.math.union.edu/~dpvc/jsMath/**. Use the **Download the TeX** fonts option. Full instructions for their use can be found at: **http://pubpages.unh.edu/~jsh3/jsMath/**

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Indices - Exam questions

Questions: **10** Time: **44 minutes** Total Marks: **35**

Q1 - ID: 7841 *[4 marks, 5 minutes]*

(a) Find the value of $27^{-\frac{1}{3}}$

(b) Simplify $x(4x^{\frac{1}{3}})^3$

Q2 - ID: 7876 *[5 marks, 6 minutes]*

(a) Simplify $(3a^2b)^3 \times 4b^4$.

(b) Evaluate $\left(\frac{1}{16}\right)^{-1}$

(c) Evaluate $(16)^{\frac{3}{2}}$

Q3 - ID: 7738 *[4 marks, 5 minutes]*

Express each of the following in the form 2^n

(a) $\frac{1}{4}$

(b) $\sqrt[2]{2}$

(c) $2^{10} \times 4^9$

Q4 - ID: 7035 *[3 marks, 4 minutes]*

Find the value of each of the following.

(a) $2^2 \times 2^{-2}$

(b) $64^{\frac{3}{2}}$

Q5 - ID: 5816 *[4 marks, 5 minutes]*

(a) Express $27\sqrt{3}$ in the form 3^k.

(b) Simplify $(3a^5b^7)^2$

Q6 - ID: 5811 *[2 marks, 2 minutes]*

State the value of each of the following

(a) 4^{-2}

(b) 11^0

Q7 - ID: 5773 *[4 marks, 5 minutes]*

Simplify
(a) $(\sqrt[5]{x})^{15}$
(b) $\dfrac{2y^6 \times (9y)^3}{3y^3}$

Q8 - ID: 5657 *[3 marks, 4 minutes]*

Given that $27\sqrt{3} = 3^a$, find the value of a.

Q9 - ID: 4846 *[3 marks, 4 minutes]*

(a) Write down the value of $81^{\frac{1}{4}}$
(b) Find the value of $81^{\frac{3}{4}}$.

Q10 - ID: 7940 *[3 marks, 4 minutes]*

Find the value of
(a) $9^{\frac{1}{2}}$
(b) $9^{-\frac{3}{2}}$

Indices - Exam questions - Mark Scheme

A1 - ID: 7841

[4 marks, 5 minutes]

(a) $27^{-\frac{1}{3}} = \frac{1}{27^{\frac{1}{3}}}$ | $M1$

$= \frac{1}{3}$ | $A1$

(b) $x(4x^{\frac{1}{3}})^3 = x(4^3x)$ | $M1$

$= 64x^2$ | $A1$

A2 - ID: 7876

[5 marks, 6 minutes]

(a) $(3a^2b)^3 \times 4b^4 = 27a^6b^3 \times 4b^4$ | $B1$

$= 108a^6b^7$ | $A1$

(b) $\left(\frac{1}{16}\right)^{-1} = 16$ | $B1$

(c) $(16)^{\frac{3}{2}} = (4)^3 = 64$ | $M1A1$

A3 - ID: 7738

[4 marks, 5 minutes]

(a) $\frac{1}{4} = 2^{-2}$ | $B1$

(b) $\sqrt[2]{2} = 2^{\frac{1}{2}}$ | $B1$

(c) $2^{10} \times 4^9 = 2^{10} \times 2^{18} = 2^{28}$ | $M1A1$

A4 - ID: 7035

[3 marks, 4 minutes]

(a) $2^2 \times 2^{-2} = 1$ | $M1A1$

(b) $64^{\frac{3}{2}} = 512$ | $B1$

A5 - ID: 5816

[4 marks, 5 minutes]

(a) $27\sqrt{3} = 3^3 \times 3^{\frac{1}{2}} = 3^{3.5}$ | $M1A1$

(b) $(3a^5b^7)^2 = 9a^{10}b^{14}$ | $M1A1$

A6 - ID: 5811

[2 marks, 2 minutes]

(a) $4^{-2} = \frac{1}{16}$ | $B1$

(b) $11^0 = 1$ | $B1$

A7 - ID: 5773 *[4 marks, 5 minutes]*

(a) $(\sqrt[5]{x})^{15} = x^3$ | $B1$

(b) $\dfrac{2y^6 \times (9y)^3}{3y^3} = \dfrac{2y^6 \times 729y^3}{3y^3}$

$= \dfrac{1458y^9}{3y^3}$ | $B2$

$= 486y^6$ | $B1$

A8 - ID: 5657 *[3 marks, 4 minutes]*

$27\sqrt{3} = 3^3 \times 3^{\frac{1}{2}}$ | $M1A1$

$= 3^{\frac{7}{2}}$

$\Rightarrow a = \frac{7}{2}$ | $A1$

A9 - ID: 4846 *[3 marks, 4 minutes]*

(a) $81^{\frac{1}{4}} = 3$ | $B1$

(b) $81^{\frac{3}{4}} = \left(81^{\frac{1}{4}}\right)^3 = 3^3 = 27$ | $M1A1$

A10 - ID: 7940 *[3 marks, 4 minutes]*

(a) $9^{\frac{1}{2}} = 3$ | $B1$

(b) $9^{-\frac{3}{2}} = (9^{-\frac{1}{2}})^3$ | $M1$

$= (\frac{1}{3})^3 = \frac{1}{27}$ | $A1$