

# Fractional Indices

The PowerPoint contains the slides shown below and these give an animated presentation explaining how to deal with fractional indices such as  $4^{1/2}$  and  $8^{2/3}$ . There are questions with worked answers.

Fractional Indices

Objective: Understand how to deal with fractional indices such as  $4^{1/2}$  and  $8^{2/3}$

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).



1



Writing a Roots as an Fractional Indices

We can write a square root and a cube root as fractional index. We do it like this...

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).

2



$\sqrt[3]{9} = 9^{1/3}$   
and  
 $\sqrt[3]{64} = 64^{1/3}$

We don't normally write the number 2 on a square root

But we always write the number 3 on a cube root symbol

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).

3



We can write roots and powers (indices) as fractions like this:

$\sqrt[3]{8^2} = 8^{2/3}$

The root is always the fraction's denominator

The power (index) is always the fraction's numerator

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).

4

These relationships are very useful for evaluating (working out) fractional indices.

For example, what is the value of  $8^{2/3}$ ?

Write as a root and power  $\rightarrow \sqrt[3]{8^2}$  Workout the power

$\rightarrow \sqrt[3]{64}$

The cube root of 64 is 4  $\rightarrow 8^{2/3} = 4$

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).



5



Write these as the root of a power and evaluate without using a calculator

- $9^{1/2}$
- $8^{1/3}$
- $125^{1/3}$
- $49^{1/2}$
- $1000^{1/3}$
- $225^{1/2}$
- $27^{1/3}$
- $169^{1/2}$

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).

6



Write these as the root of a power and evaluate without using a calculator

- $9^{1/2} \rightarrow \sqrt{9} = 3$
- $8^{1/3} \rightarrow \sqrt[3]{8} = 2$
- $125^{1/3} \rightarrow \sqrt[3]{125} = 5$
- $49^{1/2} \rightarrow \sqrt{49} = 7$
- $1000^{1/3} \rightarrow \sqrt[3]{1000} = 10$
- $225^{1/2} \rightarrow \sqrt{225} = 15$
- $27^{1/3} \rightarrow \sqrt[3]{27} = 3$
- $169^{1/2} \rightarrow \sqrt{169} = 13$

© 2014 Pearson Education, Inc. or its affiliate(s). All rights reserved. This document is intended solely for the personal use of the individual user and is not to be disseminated broadly. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without the prior written permission of Pearson Education, Inc. or its affiliate(s).

7