

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

3300U50-1



**MONDAY, 11 NOVEMBER 2019 – AFTERNOON**

**MATHEMATICS  
UNIT 1: NON-CALCULATOR  
HIGHER TIER**

1 hour 45 minutes

**ADDITIONAL MATERIALS**

The use of a calculator is not permitted in this examination.  
A ruler, a protractor and a pair of compasses may be required.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space use the additional page at the back of the booklet. Question numbers must be given for all work written on the additional page.

Take  $\pi$  as 3.14.

**INFORMATION FOR CANDIDATES**

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

In question **10**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	5	
3.	4	
4.	3	
5.	4	
6.	6	
7.	3	
8.	7	
9.	3	
10.	9	
11.	4	
12.	4	
13.	4	
14.	3	
15.	5	
16.	4	
17.	4	
18.	4	
<b>Total</b>	<b>80</b>	

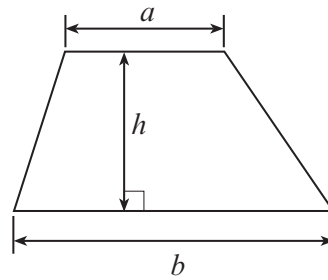
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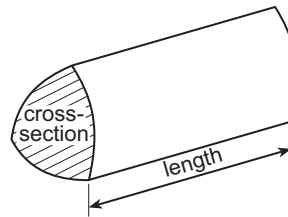
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### Formula List - Higher Tier

**Area of trapezium** =  $\frac{1}{2}(a + b)h$

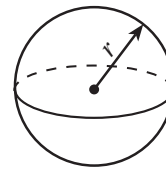


**Volume of prism** = area of cross-section  $\times$  length



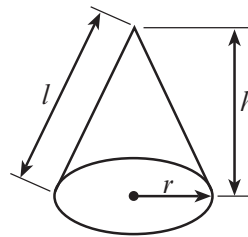
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**Surface area of sphere** =  $4\pi r^2$



**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** =  $\pi r l$

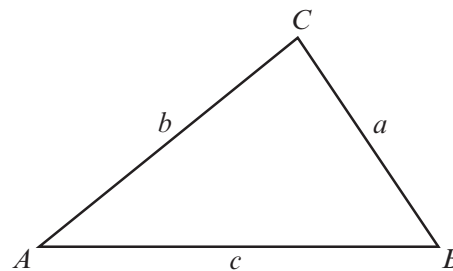


**In any triangle ABC**

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2}ab \sin C$



### The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$  where  $a \neq 0$  are given by  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

### Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula  $\left(1 + \frac{i}{n}\right)^n - 1$ , where  $i$  is the nominal interest rate per annum as a decimal and  $n$  is the number of compounding periods per annum.



1. The exterior angle of a regular polygon is  $36^\circ$ .

(a) How many sides does the polygon have? [2]

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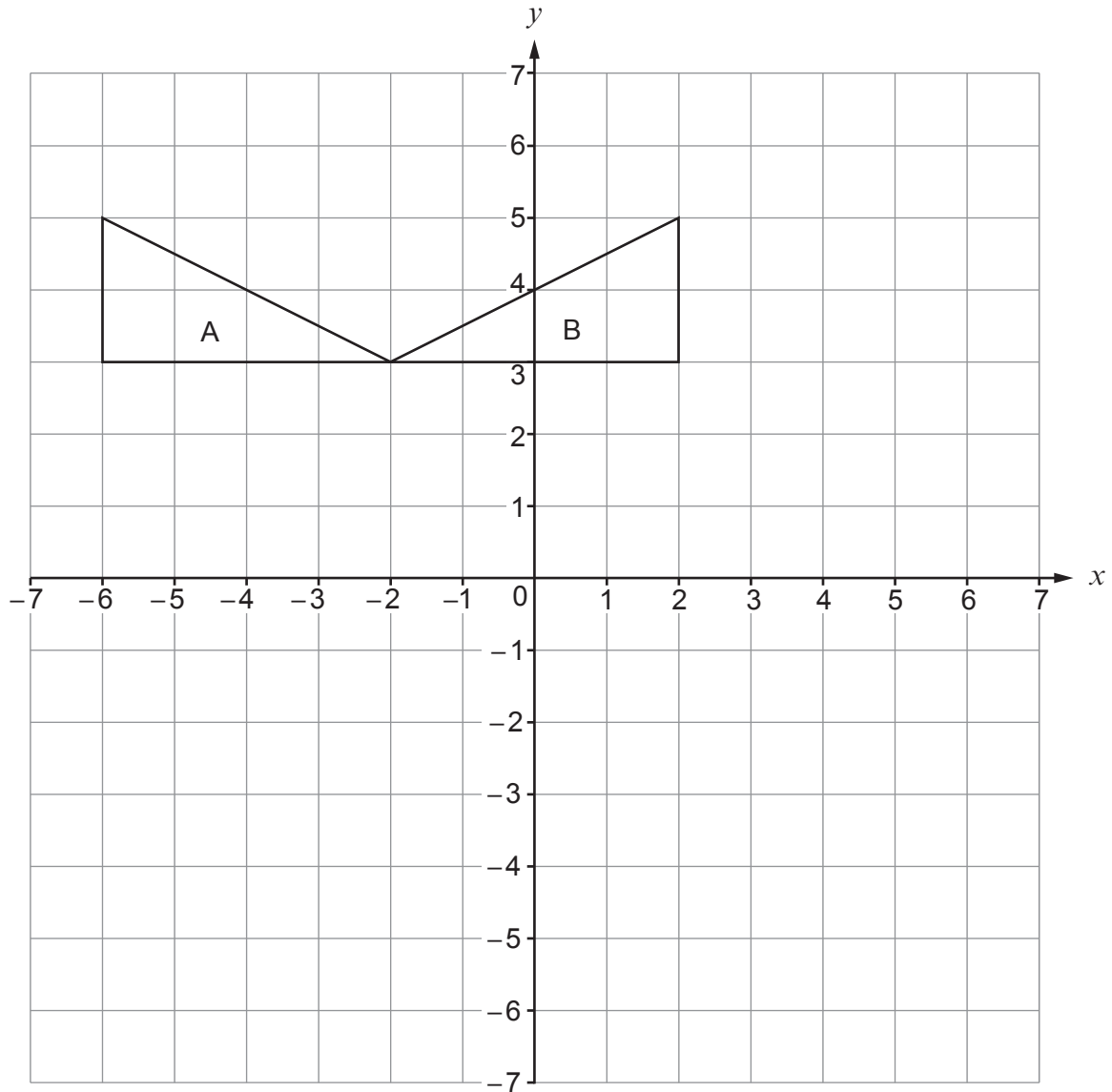
(b) Calculate the sum of all the interior angles of this regular polygon. [2]

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2. (a) Describe fully the single transformation that transforms triangle A onto triangle B. [2]



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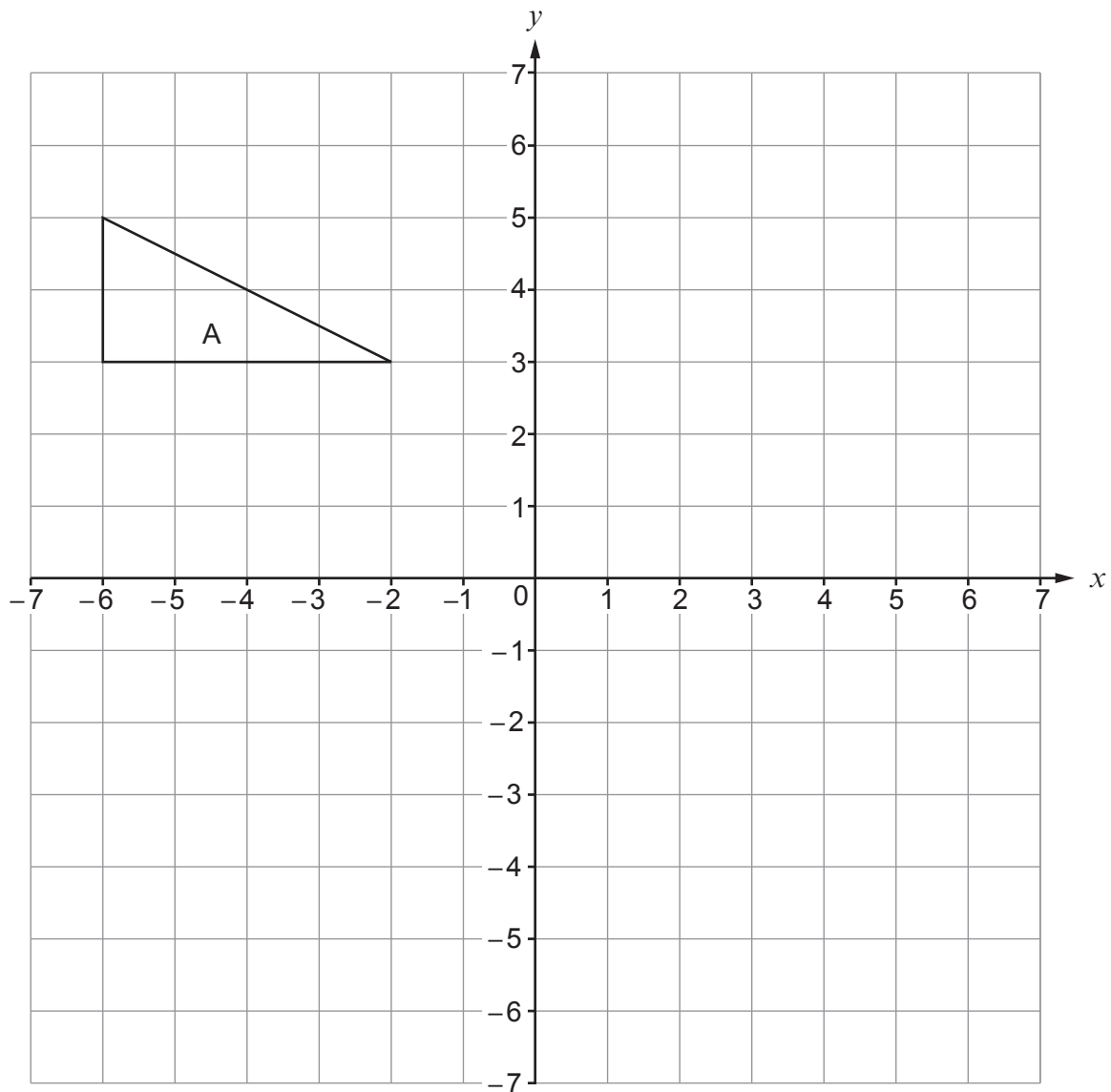
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- (b) (i) Translate triangle A using the column vector  $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ .

[2]



- (ii) Write down the column vector that will reverse the translation in part (i).

[1]

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3. (a) Write down the first three terms of the sequence whose  $n$ th term is given by  $n^2 - 6$ . [2]

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1st term = .....      2nd term = .....      3rd term = .....

- (b) Write down an expression for the  $n$ th term of the following sequence. [2]

5,      11,      17,      23,      ...

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4. Circle the correct answer for each of the following.

(a)  $81 =$

[1]

$3^3$

$9^3$

$9^4$

$18^2$

$3^4$

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(b)  $2 \cdot 15 =$

[1]

$32 \cdot 5$

$10 \cdot 5$

$40 \cdot 84101$

$30 \cdot 84101$

$32 \cdot 1$

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.....

(c)  $(12 \cdot 96)^{\frac{1}{2}} =$

[1]

$6 \cdot 48$

$3 \cdot 6$

$4 \cdot 32$

$3 \cdot 3$

$2 \cdot 16$

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5. (a) Using only a ruler and a pair of compasses, construct a triangle  $PQR$ , so that it satisfies **both** of the following conditions:

- $\hat{PQR} = 60^\circ$ ,
- $PQ = 7$  cm.

Side  $QR$  has been drawn for you.

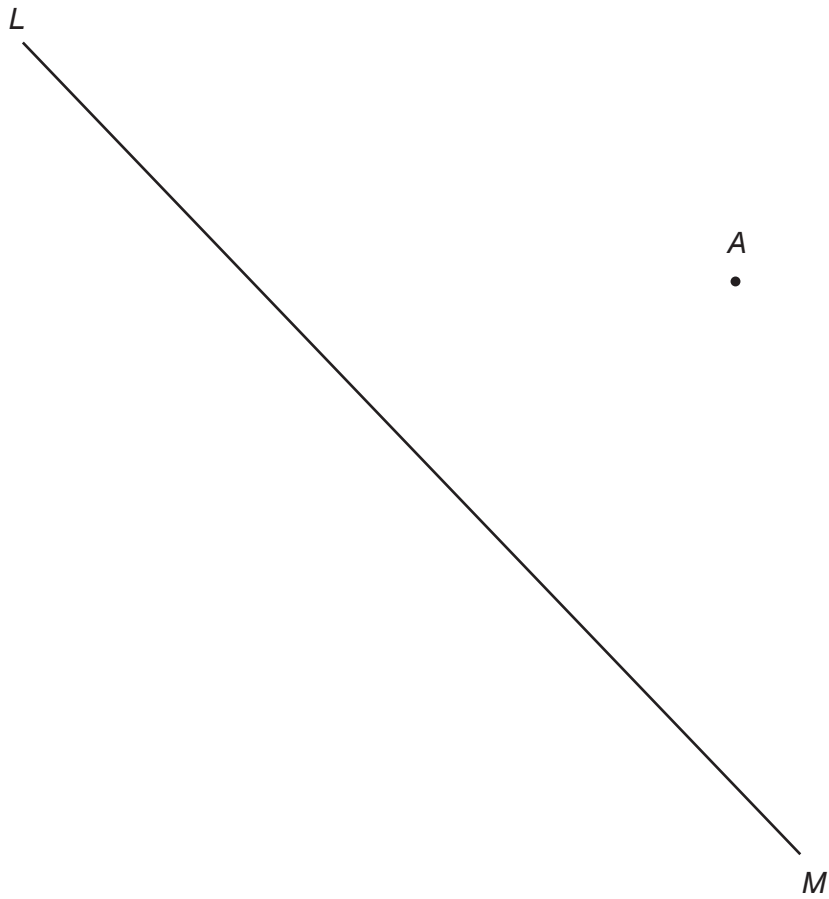
[2]

Q ————— R





- (b) Using only a ruler and a pair of compasses, construct a line from the point  $A$  that is perpendicular to the line  $LM$ . [2]



6. Dylan is having a weekend break in Wrexham.  
 The probability that he will visit *Erddig Gardens* is 0.7.  
 The probability of Dylan going to the *Bersham Heritage Centre* is independent of him visiting *Erddig Gardens*.

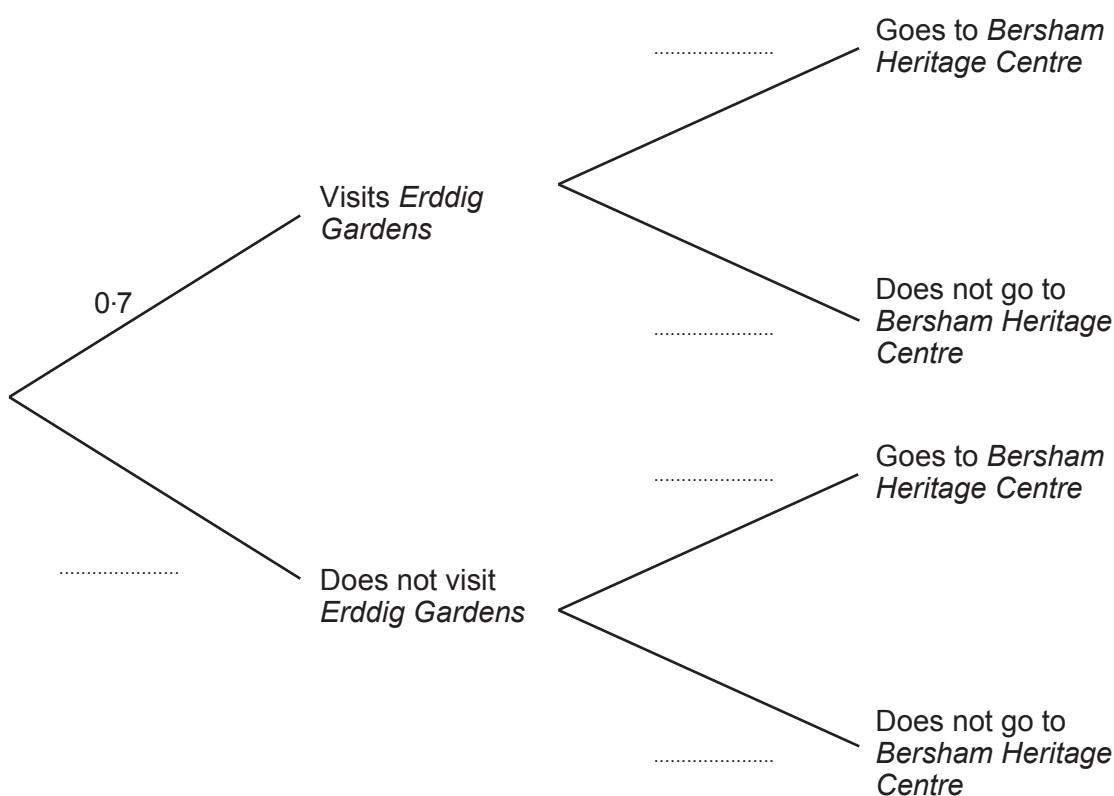
The probability that he visits *Erddig Gardens* **and** goes to the *Bersham Heritage Centre* is 0.28.

- (a) Complete the following tree diagram. [4]

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- (b) Calculate the probability that Dylan visits *Erddig Gardens* but does not go to the *Bersham Heritage Centre*. [2]

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7. In the following formulae, each measurement of length is represented by a letter.

Consider the dimensions implied by the formulae.

For each case, write down whether the formula could be for a **length**, an **area**, a **volume** or **none of these**.

The first one has been done for you.

[3]

<u>Formula</u>	<u>Formula could be for</u>
$3 \cdot 14r^2 - dw$	area
$w^3 + r^2d$	.....
$3w + 2d + h$	.....
$dhr + 5d^3$	.....
$4d + \pi r^2$	.....
$\frac{dwh}{r}$	.....



8. (a) Factorise  $x^2 + 4x - 21$ . Hence, solve  $x^2 + 4x - 21 = 0$ .

[3]

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- (b) Solve the equation  $\frac{2x-3}{5} + \frac{4x+5}{2} = \frac{11}{2}$ .

[4]

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9. A cuboid has dimensions of 40 mm, 25 mm and 12 mm. All of these measurements are correct to the nearest mm.

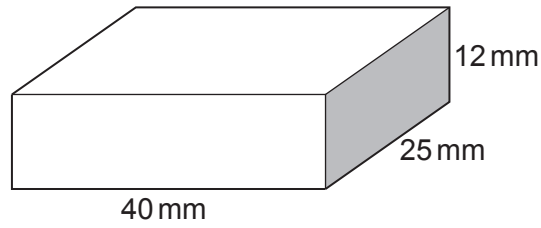


Diagram not drawn to scale

Four of these cuboids are stacked together as shown below.

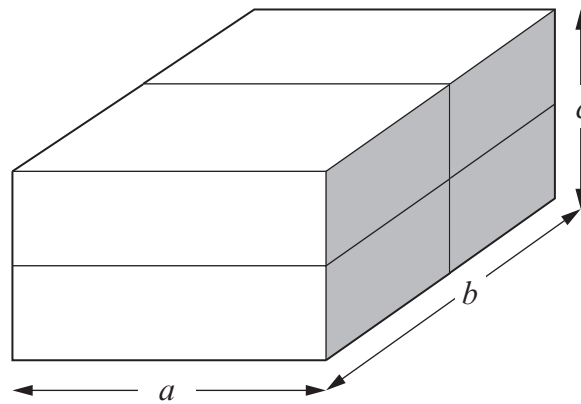


Diagram not drawn to scale

- (a) Write down the **greatest** possible value of length  $a$ . Give your answer in mm. [1]

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- (b) Calculate the **greatest** possible value of length  $b$ . Give your answer in mm. [1]

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- (c) Calculate the **least** possible value of length  $c$ . Give your answer in mm. [1]

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13. (a) Show that

[3]

$$6x(8x + 1) - 3(4x + 1)(4x - 1) \equiv 6x + 3.$$

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(b) Hence, write down the value of  $x$  for which  $6x(8x + 1) - 3(4x + 1)(4x - 1) = 0$ . [1]

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14. (a) Express  $0.4\overline{75}$  as a fraction.

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(b) Circle the correct answer for the following statement.

[1]

$16^{-\frac{3}{4}}$  is equal to

-12

 $\frac{1}{8}$ 

-8

 $\frac{1}{12}$ 

-16.75

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