

How can we Design courses for STEM on Moodle?

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We use

- Core Moodle recourses
- Core Moodle activities
- Moodle plugins
- Html code

Notation and editors





Writing maths using TeX notation

https://docs.moodle.org/en/Using_TeX_Notation

The screenshot shows a Moodle forum post with a rich text editor toolbar at the top. The text of the post asks how to write the fraction "three fourth" using TeX notation. It provides the TeX code `$$ \frac{3}{4} $$` and shows the rendered result, which is the fraction $\frac{3}{4}$. A yellow highlight is placed over the TeX code in the editor. At the bottom of the post, there are two buttons: "Save changes" and "Cancel".

How do we write the fraction "three fourth" using TeX notation? We copy something like [that](#) and ... modify it: Πώς γράφουμε το κλάσμα "τρία τέταρτα" με TeX notation? Αντιγράφουμε κάτι [παρόμοιο](#) ... και το τροποποιούμε:

`$$ \frac{3}{4} $$`

$$\frac{3}{4}$$

[Save changes](#) [Cancel](#)

<https://youtu.be/-pj-nr8xTps>



Writing maths using TeX in Atto Equation editor

https://docs.moodle.org/en/Text_editor

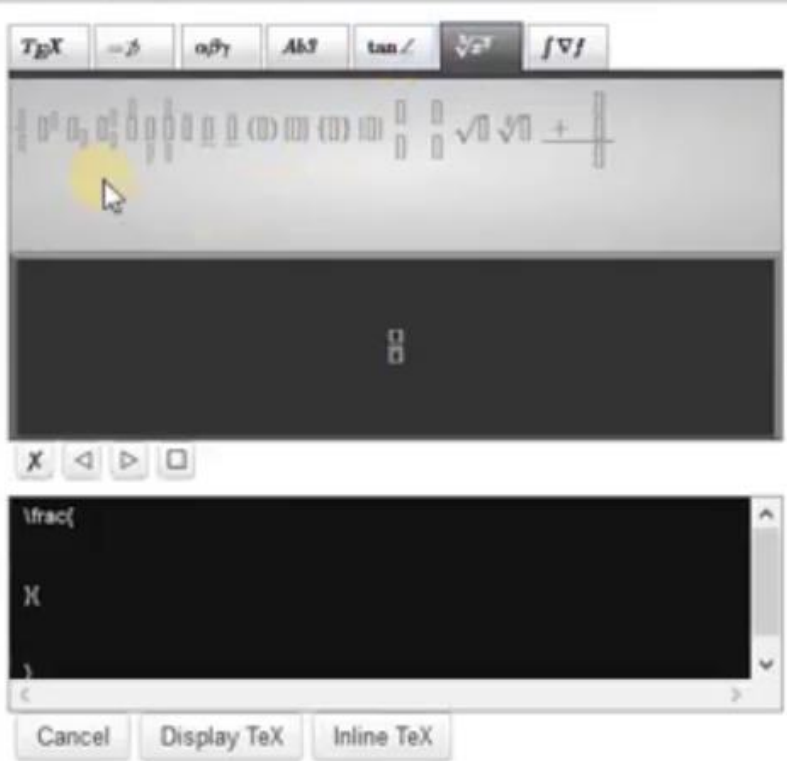


<https://youtu.be/rwhdnicTPqs>



Writing maths using TeX in Atto Mathslate editor

https://moodle.org/plugins/atto_mathslate



$$\frac{3}{4}$$

<https://youtu.be/XEUsWFYVmCk>



Writing maths in Wiris editor

https://moodle.org/plugins/atto_wiris



<https://youtu.be/qePnH6PFhW4>

Chemistry notation





Writing Dichromate anion using mhchem notation

https://docs.moodle.org/en/Chemistry_notation_using_mhchem

How do we write the Dichromate anion using mhchem notation? We copy something like **that** and ... modify it: Πώς γράφουμε το Διχρωμικό ανιόν με mhchem notation? Αντιγράφουμε κάτι **παρόμοιο** ... και το τροποποιούμε:

$$\text{Cr}_2\text{O}_7^{2-}$$

`\(\ce{Cr2O7^2-}\)`

<https://youtu.be/aGMgZJy85yE>



Writing Dichromate anion using Atto chemistry editor

https://moodle.org/plugins/atto_chemistry

Chemistry editor

Formulae Symbols & units Bonds & arrows Greek Italic H-Cn La-Lu & Ac-Lr

X^+ X^{2+} Y^{3+} X^- X^{2-} X^{3-} X_2 X_2Y X_2Y_3 aX aX_b $^aX^c$ $\frac{a}{b}X$ $\frac{X}{b}$ $\frac{X}{b}$ $\pm$ $+$

$\oplus$ $\ominus$ $-$ e^- I II III IV V VI VII VIII IX X (s) (l) (g) (aq)

Edit chemistry using TeX mhchem

Cr2O7²⁻

Cr₂O₇²⁻

Chemistry preview

Cr₂O₇²⁻

An arrow indicates the position that new elements from the element library will be inserted.

<https://youtu.be/UVIBCDSo5Ao>



Writing Dichromate anion using Wiris chemistry editor

https://moodle.org/plugins/atto_wiris



<https://youtu.be/jGXy43pvkUg>

Moodle resources and activities





Assignment with Rubric and PHET simulation

<https://phet.colorado.edu/>

☐ My Block
 ☒ Material

Wood ▼

Mass

2.00

Volume

5.00

Density

Wood Ice Brick Alu

0.40 kg/L

2.00 kg

102.00 L

Wrong calculation explanation	Wrong calculation 0 points	Wrong calculation without explanation 1 points	Wrong calculation, right explanation 2 points
Density calculation	Wrong calculation 0 points	Wrong calculation without or with wrong unit 1 points	Wrong calculation, right unit 2 points
Units	Wrong in S.I. 0 points	Wrong S.I. units without explanation 1 points	Wrong S.I. units, right explanation 2 points

Sunday, 14 August 2016, 4:47 PM

Comments (0)

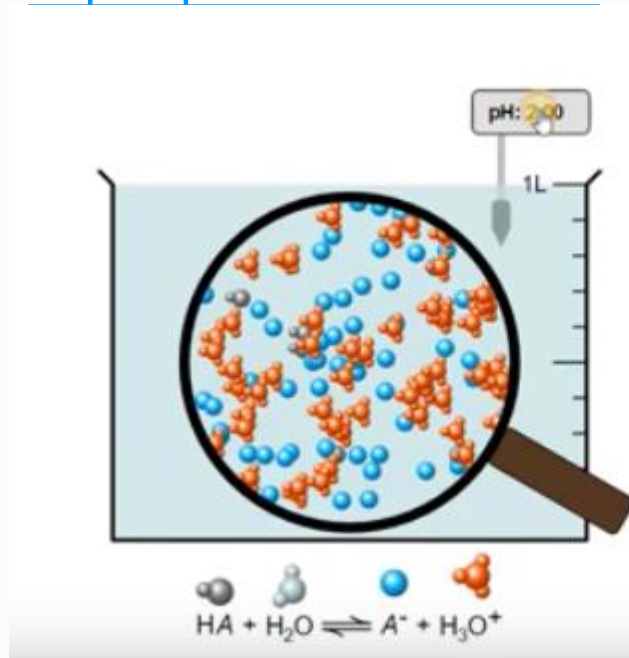
$\frac{kg}{L} = 1 \frac{kg}{l} = 1 \frac{kg}{10^{-3} m^3} = 1000 kg/m^3$

https://youtu.be/GWHpRc4B7_k



Lesson activity, question page

<https://phet.colorado.edu/>



Solution

Acid ☒ Base

Initial Concentration (mol/L):

0.001 0.01 0.1 1

Strength:

weak ☒ strong

weaker stronger

Views

☒ Molecules

☐ Solvent

☐ Graph

☐ Hide Views

Tools

What is the PH of a strong acid solution with initial c

Click to Run

pH: 0.00

$\text{HA} + \text{H}_2\text{O} \rightleftharpoons \text{A}^- + \text{H}_3\text{O}^+$

PHET

<https://youtu.be/kA9-mxViiw>

<https://youtu.be/-vSWWnfUuuc>



External tool, Chemvantage Quiz

https://docs.moodle.org/en/LTI_and_Moodle

✓ 1. What is the oxidation number of nitrogen in $\text{NO}_3^-(\text{aq})$?

Enter the correct numerical value to 1.0% precision. Express scientific notation like 4.29E-15

5

✓ 2. When aqueous solutions of CaBr_2 and NH_4OH are mixed, what happens?

Select only the best answer:

- **no reaction**
- $\text{Ca}(\text{OH})_2$ precipitates
- NH_4Br precipitates
- $\text{Ca}(\text{NH}_4)_2$ precipitates
- BrOH precipitates

✓ 3. The number of hydrogen atoms in the formula unit for sodium bicarbonate is

Enter the correct numerical value to 1.0% precision. Express scientific notation like 4.29E-15

1

Moodle quiz

Moodle question bank

Simple questions





True False question type

True/False question type

1 kg Cotton will weigh more than 1 kg Iron.

<h5>True/ False question type**</h5>
**
Heading tag **Line break tag**
**** 1 kg Cotton
will weigh more than 1 kg Iron****

**** Λογικά ένα
κιλό (1 kg) βαμβάκι είναι πιο «βαρύ», από ένα
κιλό (1 kg) σίδηρο.****

Multi language

Select one:

- ☒ True ✗
- ☐ False

A given volume of iron will weigh more than the same volume of cotton.!

The weight of a body is proportional to its mass. So, bodies with equal masses have equal weights.

<https://youtu.be/aAsXQHsWI9c>



Short Answer question type

Preview question: Short-A... X +

stem.widetesting.info/question/pn

Search

Preview question: Short-Answer question

Question 1
Not yet answered
Marked out of 1.00

Short-Answer question type

Για γράψετε όλους τους διψήφιους αριθμούς που περιέχουν το ψηφίο 0, διατεταγμένους σε φθίνουσα σειρά, χρησιμοποιώντας το κατάλληλο σύμβολο της ανισότητας ανάμεσα τους.
Προσοχή: Μην αφήσετε κενά πληκτρολογώντας.
Για παράδειγμα: 15>14 και Όχι 15 > 14!

Answer: 10>20>30>40>1-50>70>80>90

Start again Save Fill in correct responses Submit and finish Close preview

Technical information ⓘ

Attempt options

Answer 2 10>20>30>40>50>60>70>80>90

Grade None

Feedback

Paragraph B I

The order is not descending, the inequality symbol is not correct! Η σειρά δεν είναι φθίνουσα, το σύμβολο ανισότητας δεν είναι το σωστό!

<https://youtu.be/aAsXQHsWI9c>



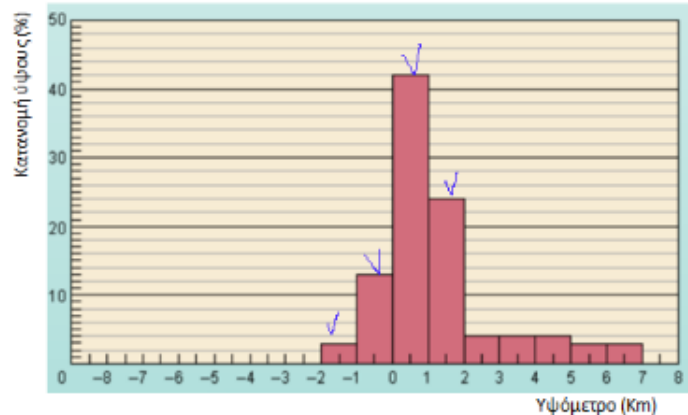
Multiple choice one answer question type

Select one:

- ☐ 66%
- ☒ 70% ✗ You probably included the percentage of the surface which has an altitude between 2 km and 3 km. Have you take into account that there are negative altitudes?
- ☐ 82%
- ☐ Κανένα από αυτά.

Η απάντηση δεν είναι σωστή

$3\% + 13\% + 42\% + 24\% = 82\%$ ή $100\% - (2 \cdot 3\% + 3 \cdot 4\%) = 82\%$



The correct answer is: 82%

<https://youtu.be/h2oUVBVGn1g>



Multiple choice multiple answers question type

Question 1

Not yet answered

Marked out of 1.00

Multiple Choice question type

Select the sentences that you think they are CORRECT.

If you select a wrong one you lose points!

If you divide a piece of plasticine into two equal pieces, then each of the pieces obtained will have:

Select one or more:

- ☒ 1. Less mass than the mass of the original piece. ✓
- ☒ 2. Volume smaller than the volume of the original piece.. ✓
- ☒ 3. Lower density than the density of the original piece. ✗ The density of a material does not depend on mass and volume. It has the same value.

Your answer is partially correct.

You have selected too many options.

- You have divide the piece of plasticine into two equal pieces! Therefore, they have smaller volume and mass than the original piece.
- Since it is the same material density is the same.

The correct answer is: Less mass than the mass of the original piece., Volume smaller than the volume of the original piece..

<https://youtu.be/slkKWHHA003Y>



Matching question type

Question 1

Not answered

Marked out of 1.00

Matching question type

The different states of matter.

Match:



Liquid ▼



Gas ▼



Solid ▼



<https://youtu.be/vZr7uDHPacw>



Numerical question type

https://docs.moodle.org/en/Numerical_question_type

The gravitational constant, denoted by the letter G , is an empirical physical constant involved in the calculation of gravitational effects.

Its value is approximately $G = 6.674 \cdot 10^{-11} \frac{N \cdot m^2}{kg^2}$

The error in this question is $1 \cdot 10^{-14}$.

Fill the text box with an acceptable number and the unit of the constant.

Answer: ✓

Answer 1

Error

Ok!!!

$6.673...6.675 E-11 Nm^2kg^{-2} (Nm^2/kg^2)$

The correct answer is: $6.674E-11 Nm^2kg^{-2}$

<https://youtu.be/w0mYQ5FSqlA>

Moodle question bank

Complex

questions





Embedded answers Cloze question

[https://docs.moodle.org/en/Embedded_Answers_\(Cloze\)_question_type](https://docs.moodle.org/en/Embedded_Answers_(Cloze)_question_type)

Embedded answers (Cloze) question

To construct the graph of a secondary function, the parable, the following method is proposed:

We find the symmetry axis

We find the top

We find the intersection points with the two axes.

We design the line

Let's apply these to the construction of the parabola

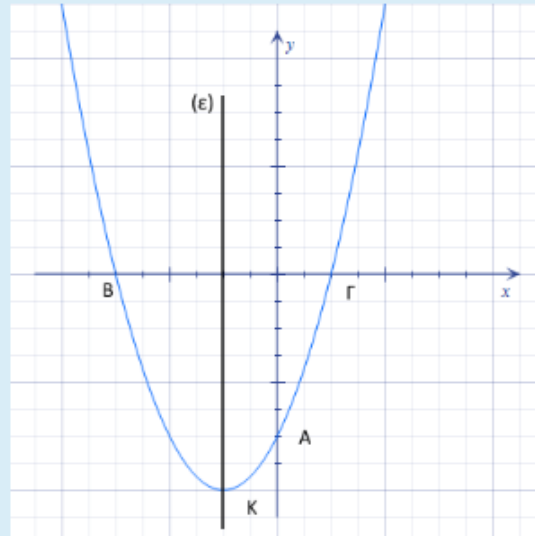
$$y = x^2 + 2x - 3$$

The symmetry axis is the line $(\epsilon) : \square = -\frac{\beta}{2\alpha} = \square$

Its peak is the point $K \left(-\frac{\beta}{2\alpha}, -\frac{\Delta}{4\alpha} \right) = (\square, \square)$

Intersects the axis y'y at point A ($\square$, $\square$)

Intersects the negative semi axis to point B ($\square$, $\square$) and the positive to point Γ ($\square$, $\square$).



Enter only numbers and without spaces between them!

<https://youtu.be/gbM5poCrKW0>



Select missing words question type

https://docs.moodle.org/en/Select_missing_words_question_type

State whether the phrases are right or wrong

If the phrase is wrong/false select "0", otherwise select "1"

1. Identity is an equality containing variables and is verified for some values of these variables:
2. Identity is an equality containing variables and is verified for all values of these variables:
3. The equality $x^2 + y^2 - 2xy = (x - y)^2$ is not an identity:
4. If $\alpha + \beta = 5$ then $\alpha^2 + 2\alpha\beta + \beta^2 = 25$:

Να κάνεις τις πράξεις. Σύρε σωστά, **ανάλογα με τα χρώματα** (η πρώτη και η τέταρτη ερώτηση έχουν απάντηση στο λευκό χρώμα):

$$\left(\frac{3}{2}\right)^{-2} = \text{[[4]]}$$

$$\left(-2\right)^{0 \cdot 3} = \text{[[7]]}$$

$$2^{4 \cdot (-1)} = \text{[[10]]}$$

$$\left(-\frac{2}{3}\right)^{12} \cdot \left(\frac{2}{3}\right)^{-14} = \text{[[2]]}$$

$$4^{12} : 2^{20} = \text{[[9]]}$$

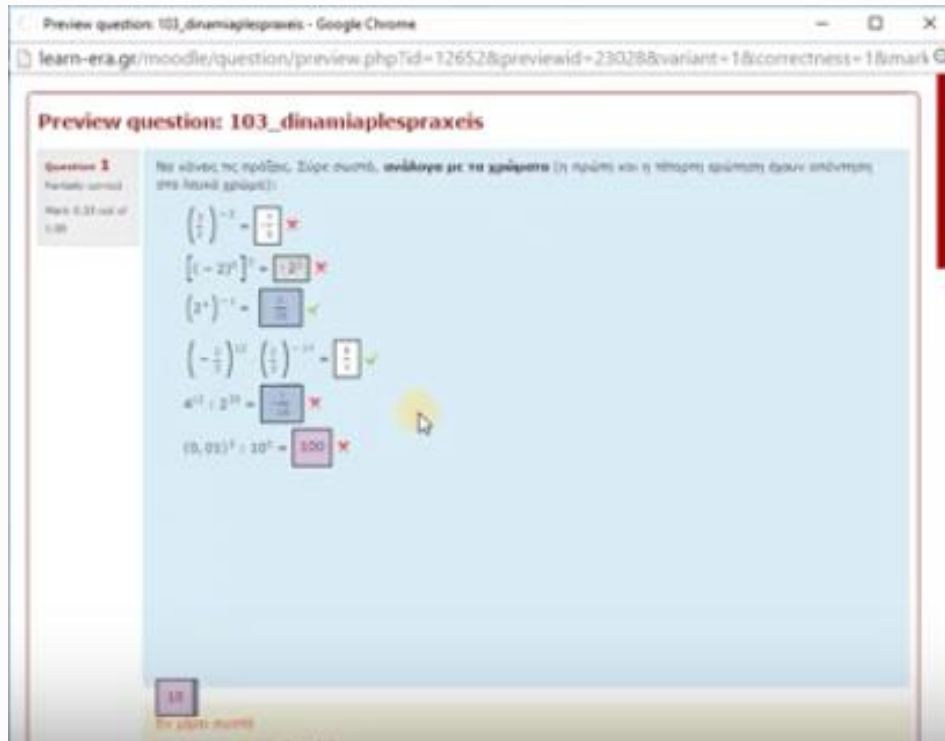
$$\left(0,01\right)^3 : 10^5 = \text{[[14]]}$$

<https://youtu.be/9g2EQhupLOI>



Drag and drop into text question type

https://docs.moodle.org/en/Drag_and_drop_into_text_question_type



<https://youtu.be/YHPWVbeTbyM>



Drag and drop onto image question type

https://docs.moodle.org/en/Drag_and_drop_onto_image_question_type

- Draggable items

☐ Shuffle drag items each time question is attempted

Draggable item 1

Type: Draggable text

Group: 1

☐ Infinite

Text:

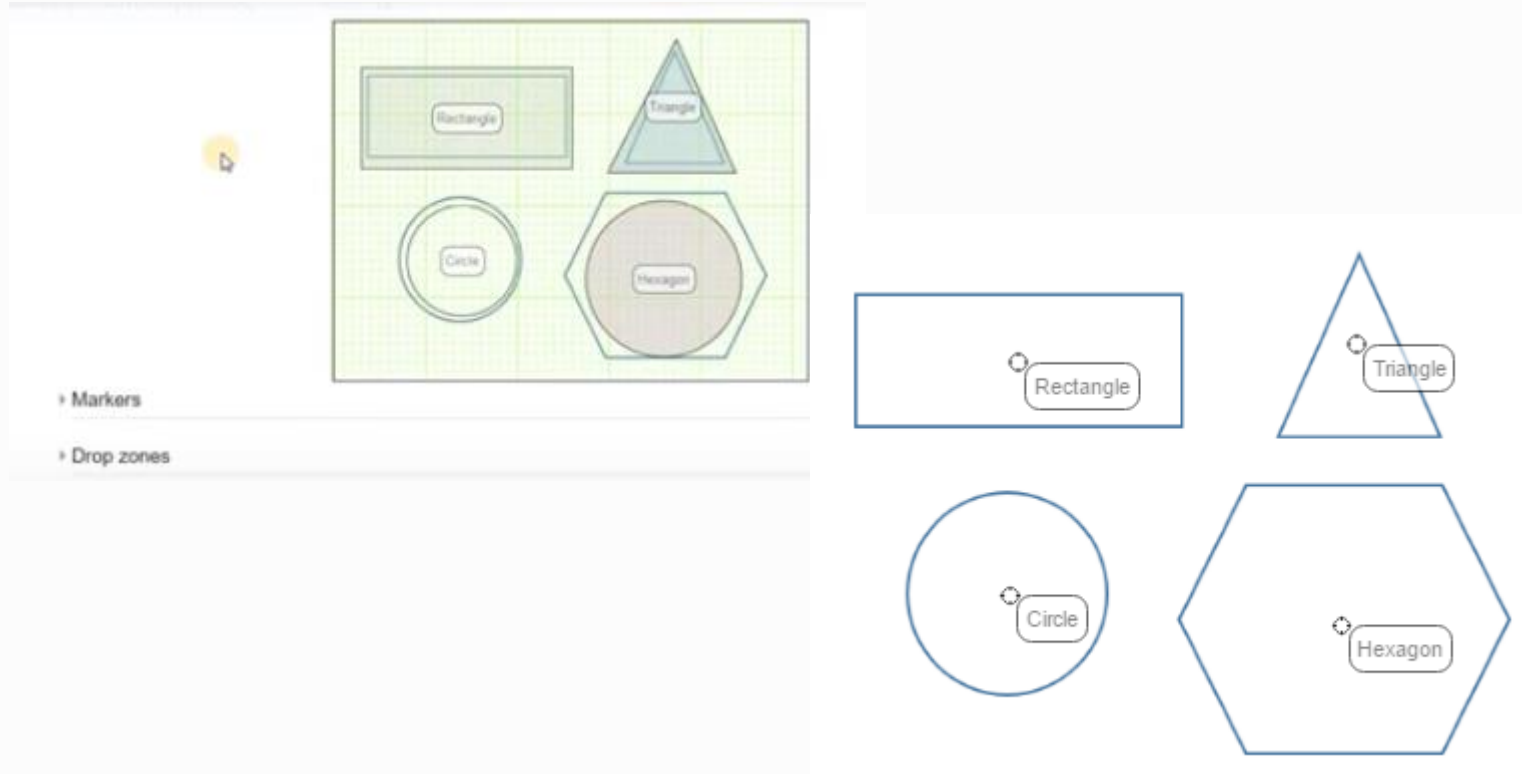


<https://youtu.be/w50hA4On1q0>



Drag and drop markers question type

https://docs.moodle.org/en/Drag_and_drop_markers_question_type



<https://youtu.be/KTCmySWxZOk>



Pattern match question

<http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=52747§ion=2.2.1>

Preview question: Pattern-match question

Ερώτηση 1
Correct
Mark 1.00 out of 1.00

Pattern-match question type

Test this question

Στην εικόνα βλέπετε ότι το λάδι επιπλέει στο νερό.



Εξηγήστε σύντομα το γιατί. Μη χρησιμοποιήσετε περισσότερες από 20 λέξεις!
ΑΠΑΝΤΗΣΤΕ ΜΕ ΚΕΦΑΛΑΙΑ ΓΡΑΜΜΑΤΑ.

Answer:

ΤΟ ΛΑΔΙ ΕΧΕΙ ΜΙΚΡΟΤΕΡΗ ΠΥΚΝΟΤΗΤΑ ΑΠΟ ΤΟ ΝΕΡΟ

<https://youtu.be/JjZOM1EFPw4>



Pattern match with JME question type

<http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=52747§ion=2.5.2>

General feedback ?

Paragraph B I

Answer 1 match CC(=O)O

Path: p » img,img-responsive



Options for the molecular editor

- ☒ Automatic generation of SMILES with E,Z stereochemistry (no)
- ☐ Stereochemistry not considered when creating SMILES ("no")



<https://youtu.be/vBf5ZHB4E6k>

Moodle question bank Mathematical questions





Simple calculated question type

https://docs.moodle.org/en/Simple_calculated_question_type

Solve for x: $\{a\} * x + \{b\} = \{c\}$

Wild card(s) values

Update the wild card(s) values

Set 10 $\{c\}/\{a\}-\{b\}/\{a\}$

11.4/1.5-3.4/1.5 = 5.33

Η σωστή απάντηση : 5.33 είναι μέσα στα όρια

Min: 5.32333333333333 — Max: 5.34333333

Set 9 $\{c\}/\{a\}-\{b\}/\{a\}$

10.2/2.5-3.3/2.5 = 2.76

Η σωστή απάντηση : 2.76 είναι μέσα στα όρια της πραγματικής τιμής

Min: 2.75 — Max: 2.77

Set 8 $\{c\}/\{a\}-\{b\}/\{a\}$

14.4/8.6-5.1/8.6 = 1.06

Η σωστή απάντηση : 1.06 είναι μέσα στα όρια της πραγματικής τιμής

Min: 1.0713953488372 — Max: 1.0913953488372

General feedback ?

Paragraph **B** *I* $\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{6}$ $\frac{7}{8}$ $\frac{9}{10}$

The equation root is $x = \frac{\{c\}}{\{a\}} - \frac{\{b\}}{\{a\}}$

Η ρίζα της εξίσωσης είναι $x = \frac{\{c\}}{\{a\}} - \frac{\{b\}}{\{a\}}$

$\frac{\{c\}}{\{a\}}$
wildcard

Answer: 7.59 ✓

Ok!!

The equation root is $x = \frac{18.9}{2.2} - \frac{2.2}{2.2}$

The correct answer is: 7.59

https://youtu.be/kLf0l5XV_Y8



Calculated multichoice question type

https://docs.moodle.org/en/Calculated_multichoice_question_type

Convert from decimal to binary the number {n}

General feedback ?

Paragraph B I

The correct answer is \({=decbin(\{n\})}\)

Range of Values Minimum 1.0

Decimal places 0

Answers

Set 10

Choice 1 ? $\{=decbin(\{n\})\}$

Shared wild card {n} 7

$\{=decbin(\{n\})\}$	$\{=decbin(7)\}$ 111
$\{=decbin(\{n\}*10)\}$	$\{=decbin(7*10)\}$ 1000110
$\{=decbin(\{n\}+2)\}$	$\{=decbin(7+2)\}$ 1001
$\{=decbin(\{n\}+1)\}$	$\{=decbin(7+1)\}$ 1000

Select one:

- ☒ 100 ✓
- ☐ 110
- ☐ 101000
- ☐ 101

Your answer is correct.

The correct answer is 100

<https://youtu.be/n1ChqMQ5U7I>



Calculated question type

https://docs.moodle.org/en/Calculated_question_type

An object has a mass of {m} kg and an acceleration of {a} m/s².

Answer 1 formula = {m}*{a}

Tolerance ±

0.01

Type

Nominal

Edit the wildcards datasets

Shared wild cards

Name
m
a

Unit handling

The unit must be given, and will be graded.

Unit penalty ?

0.4000000

as a fraction (0-1) of the response grade

Unit 1 ?

N

Multiplier

1

Unit 2

kgm²s⁻²

Multiplier

1

Unit 3

kgm²/s²

Multiplier

1

Answer: 11.31 N



ok!!

The force on the object is $F=ma=2.9*3.9$ N

<https://youtu.be/2C5cmTt8HDY>



Multinumerical question type

Find X and Y such that

$$X + Y < 20$$

$$X * Y > 35$$

Parameters	
Constraints	$X + Y < 20$ $X * Y > 35$
Per constraint feedback	OK : $X + Y < 20$ No, $X + Y \geq 20$! OK : $X * Y > 35$ No, $X + Y$

X :

Y :

OK : $X + Y < 20$

- Verified constraint : $12.00 < 20.00$

No, $X + Y$

- Unverified constraint : $35.00 > 35.00$

<https://youtu.be/9e3soBnxeyc>



Variable numeric set question type

<http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=52747§ion=2.1.3>

Consider numbers $a = 10$ & $b = 2$.

Calculate the sum of the mean value with the remainder of the division a/b

Predefined variable ▼		Calculated variable ▼	
Variable 1 ?	a	Variable 3 ?	$c = \text{average}(a, b)$
Value for variant 1 ?	10	Calculated variable ▼	
Value for variant 2	20	Variable 4 ?	$d = \text{mod}(a, b)$
Value for variant 3	30	Calculated variable ▼	
Value for variant 4	40	Variable 5 ?	$f = c + d$
Value for variant 5	50		

Answer:

6

✓

Mean value = 6

Division remainder $(a, b) = 0$

Sum = 6

<https://youtu.be/BnMON4Glf7E>



Variable numeric sets with units

<http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=52747§ion=2.1.4>

A force of $F = 4\text{ N}$ acts on the block at the angle $\theta = 60^\circ$ shown in the diagram. The block moves a horizontal distance of $s = 2\text{ m}$. How much work is done by the applied force?

Predefined variable ▼

Variable 1 ⓘ

Value for variant 1 ⓘ

Calculated variable ▼

Variable 3 ⓘ

Unit 1 ⓘ

Answer:

✓

$W = F \cdot s \cdot \cos\theta = 55\text{ J}$

The correct numerical part of the question is: 55.

<https://youtu.be/qmlrW7oDKyw>

Moodle question bank Geogebra question type





The first idea

<https://dev.geogebra.org/trac/wiki/Moodle/QuestionTypeGeoGebra>



GeoGebra Fragetypplugin für Moodle

Christoph Stadlbauer

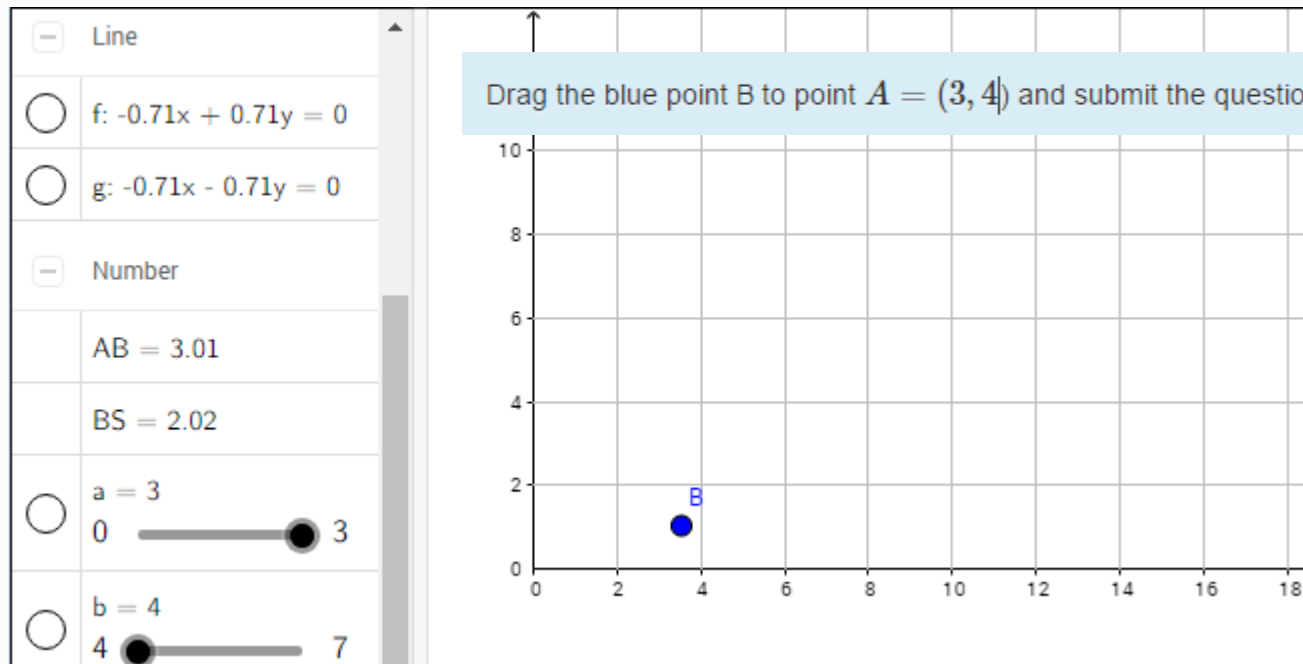
<https://youtu.be/n6IDUytQIMY>



01 Simple question

https://moodle.org/plugins/qtype_geogebra

The Boolean variable is: Distance of points A,B is less than 0.1



https://youtu.be/_RoEmzSI0j8



02 Boolean variables, Geofebra operators, Spreadsheet, Checkboxes

AND			OR		
A	B	$A \wedge B$	A	B	$A \vee B$
1	1		1	1	
0	1		0	1	
1	0		1	0	
0	0		0	0	

NOT		
A	$\neg A$	
1		
0		

XOR		
A	B	$\neg(A \wedge B)$
1	1	
0	1	
1	0	
0	0	

Boolean Value

- ☒ a = false
- ☒ b = true
- ☒ c = false
- ☐ checkand = true
- ☐ checkboxes = true
- ☐ checknand = false
- ☐ checknor = false
- ☐ checknot = true
- ☐ checkor = false
- ☐ solved = false
- ☒ wrong = true

$\neg(A \wedge B) = \neg A \wedge \neg B$ ☒ box1

$\neg(A \vee B) = \neg A \wedge \neg B$ ☒ box2

AND=NOR ☒ box3

Variable 1 Variable 1 solved Grade 100%

Feedback Απάντησες σε όλες τις ερωτήσεις σωστά!

Variable 2 Variable 2 wrong Grade None

Feedback Δεν απάντησες σωστά σε κάποια ή κάποιες από τις ερωτήσεις

<https://youtu.be/UexAOoemOrs>



03 Sliders, Placeholders, Random values

General feedback ?

Paragraph B I

The slope is Η κλίση είναι {m}

Move the slider to indicate the slope of the line.

σιορεκκλιοση = 3

$m = 4$

Variable 1 ? Variable 1 solved Grade 100%

Feedback ? Η απάντησή σου είναι σωστή! Right

Variable 2 ? Variable 2 unsolved Grade None

Feedback Η απάντησή σου είναι λανθασμένη Wrong

Blanks for 1 more variable(s)

<https://youtu.be/QUj-C16X87k>



04 Sliders, Checkboxes, Random values in Algebra

Οι ρίζες του συστήματος των εξισώσεων που ορίζουν τις δυο ευθείες είναι:
The roots of the system of equations defining the two lines are:

Αιρήσατε επιλεγμένη μόνο τη σωστή απάντηση.
De-select the wrong answers.

Το "?" σημαίνει ότι η δεν υπάρχει λύση.
"?" means that we don't have roots.

$x=5$ και $y=5$ ☒

$x=-5$ και $y=5$ ☒

$x=-5$ και $y=5$ ☒

$x=0$ και $y=5$ ☒

Variable 1 Variable 1 solved Grade 100%

Feedback Η απάντησή σου είναι σωστή! Right

Variable 2 Variable 2 unsolved Grade None

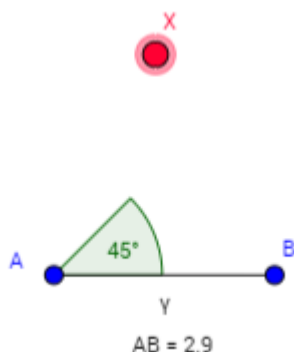
Feedback Η απάντησή σου είναι λανθασμένη Wrong

Blanks for 1 more variable(s)

<https://youtu.be/gqqOZZyizx4>



05 Moving point on other Point in Geometry



Construct a triangle $AB\Gamma$ with $AB = 7$, $B\Gamma = 6$
And angle $BA\Gamma$ 45 degrees.
After completing the above, move point X on point Γ .
In this way you will enable Moodle to check your answer!

- ☒ Show Icon to Reset Construction
- ☒ Enable Shift-Drag & Zoom
- ☒ Show Menu
- ☒ Show Toolbar
- ☒ Show Input Bar

Variable 1 Variable 1 solved Grade 100%

Feedback Η απάντησή σου είναι σωστή! **Right**

Variable 2 Variable 2 unsolved Grade None

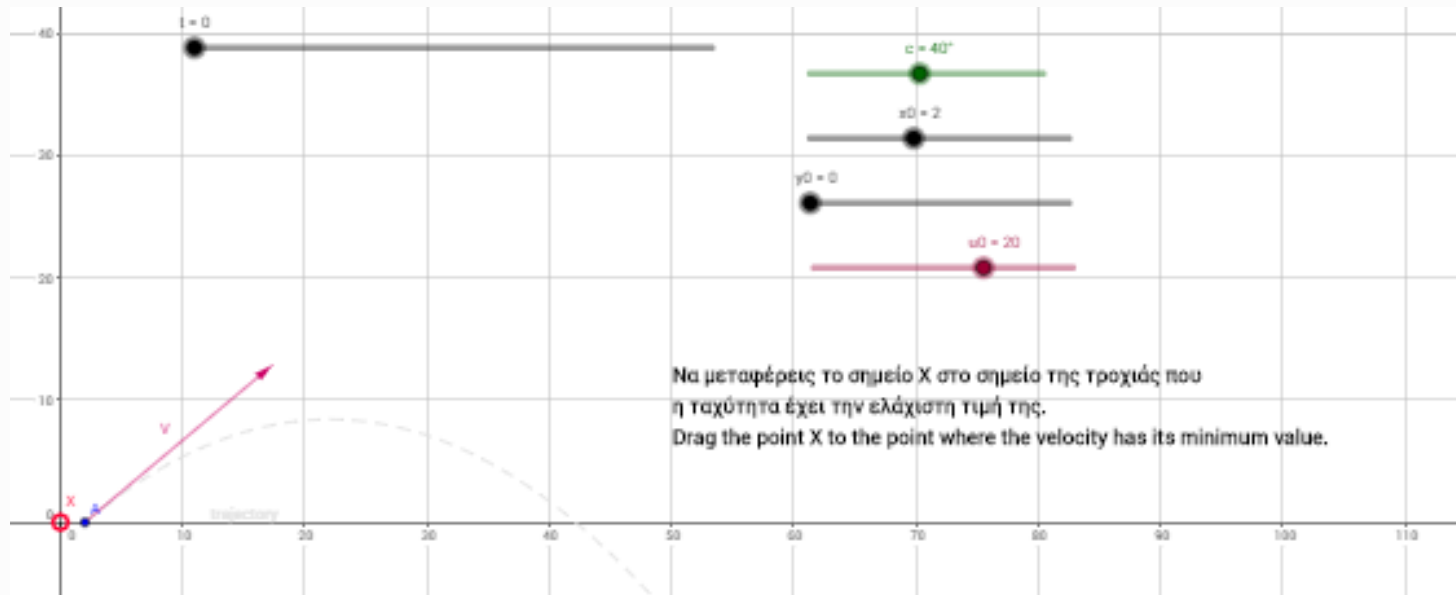
Feedback Η απάντησή σου είναι λανθασμένη **Wrong**

Blanks for 1 more variable(s)

<https://youtu.be/igfMOju2es8>



06 Moving point on other Point in Physics



https://youtu.be/je9T_X1b7EE



07 Moving point on other Point in Chemistry, Write in the colored cell

WaterVolume = 7

	A	B
1	7	0.25
2		
3	20	

Variable 1 Variable 1 solved Grade 100% ▼

Feedback Είναι σωστές και οι δυο απαντήσεις! Both answers are correct!

Variable 2 Variable 2 solved20 Grade 50% ▼

Feedback Σωστή η συγκέντρωση, λάθος το σημείο. Correct concentration, wrong point.

Variable 3 Variable 3 solvedinit Grade 50% ▼

Feedback Σωστό σημείο, λάθος συγκέντρωση. Correct point, wrong concentration.

Variable 4 Variable 4 wrong Grade None ▼

Feedback Είναι λανθασμένες και οι δυο απαντήσεις. Both answers are incorrect.

<https://youtu.be/qBl1fpf9P3A>

Moodle question bank Formulas question type

[The project](#)

[Documentation](#)

[Tutorial](#)





01 Simple question

https://moodle.org/plugins/qtype_formulas

Example 1 Simple question

What is 3 + 4?

7 ✓

One possible correct answer is: 7

▼ Part 1

Part's mark* ? 1

Local variables* ?

Answer type ? Number ▼

Answer* ? 7

Grading variables* ?

☐ Grading criteria* ? Absolute error ▼ == ▼ 0

Unit ?

Other rules* ?

Placeholder name ?

<https://youtu.be/Ksa-jyxt1Tk>



02 Placeholders Numbers Numerics Units

<https://moodle.org/mod/forum/discuss.php?d=163345>

x is the student's answer

a is the correct answer

relative error < 0.01

$$\frac{|x - a|}{a} < 0.01$$

Acceptable x : $0.99a < x < 1.01a$

If

$$a = \frac{5}{6}$$

$$0.825 < x < 0.841667$$

absolute error < 0.01

$$|x - a| < 0.01$$

Acceptable x : $a - 0.01 < x < a + 0.01$

If

$$a = \sqrt{\frac{16}{9}}$$

$$1.3233333 < x < 1.34333$$

answer the questions:

What is $1 + 2$? (#1)

What is $\frac{1}{2} + \frac{1}{3}$? (#2)

What is $\sqrt{\frac{16}{9}}$? (#3)

Convert $36 \frac{\text{km}}{\text{h}}$ to S.I. (#4)

Answer the questions:

What is $1 + 2$?

3 ✓

One possible correct answer is: 3

What is $\frac{1}{2} + \frac{1}{3}$?

5/6 ✓

One possible correct answer is: 0.83333333333333

What is $\sqrt{\frac{16}{9}}$?

sqrt(16/9) ✓

One possible correct answer is: 1.33333333333333

Convert $36 \frac{\text{km}}{\text{h}}$ to S.I.

10 m/s ✓

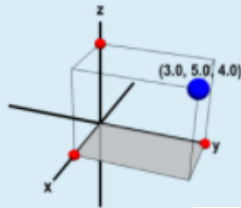
One possible correct answer is: 10 m/s

<https://youtu.be/MysR-xq8j7U>



03 Multiple answer boxes, Units – Names Matrix

Part 3



What are the coordinates of point A? $x = \{ _0 \}$, $y = \{ _1 \}$, $z = \{ _2 \}$

What are the coordinates of point A? $x =$, $y =$, $z =$



One possible correct answer is: 3, 5, 4

Part 4

What is the identity matrix: I_2

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$



One possible correct answer is: 1, 0, 0, 1

$$\left(\begin{array}{c} 0 \\ 1 \\ 2 \\ 3 \end{array} \right) \left(\begin{array}{c} 0 \\ 1 \\ 2 \\ 3 \end{array} \right)$$

<https://youtu.be/E1ysceBxf6E>



04 Variables and random values

What is the root of quadratic equation?
 $f(x) = 0$
 $f(x) = x^2 + 8x + 15$? (smaller first)

$x_1 =$ or $x_2 =$

Random variables ?

```
x1 = {-6,-5,-4};  
x2 = {-1,-2,-3};  
s = {0:4};
```

Global variables ?

```
b = -(x1 + x2);  
c = x1*x2;  
symbol = pick(s,"t","w","x","z");
```

▼ Part 1

Part's mark* ?

1

Part's text ?

Paragraph **B** *I*

$f(\text{{symbol}}) = \text{{symbol}}^2 + \text{{b}} \text{{symbol}} + \text{{c}}$? (smaller first)

$\text{{symbol}}_1 = _0$ or $\text{{symbol}}_2 = _1$

Local variables* ?

pe ?

Number ▼

er* ?

[x1,x2]

<https://youtu.be/8BWwzglRofE>



05 Simple algebraic question

Part's mark* ?

1

Answer type ?

Algebraic formula ▼

Answer* ?

"sqrt(x^2 + y^2)"

☐ Grading criteria* ?

Absolute error ▼

< ▼

1e-10

What is length of the vector (x,y)?

sqrt(x^2 + y^2) ✓

One possible correct answer is: sqrt(x^2 + y^2)

Your answer is correct.

<https://youtu.be/pjGBp12ThD8>



06 Algebraic question with variation

Part's mark* ?

2

Local variables* ?

```
x = {1:100};  
base = a*b;  
expo = b-1;
```

Random variables ?

```
a = {3:10};  
b = {3:8}
```

Answer type ?

Algebraic formula ▼

Differentiate: $8x^6$

Answer* ?

"base x^expo"

Differentiate: $5x^4$:

Grading variables* ?

☐ Grading criteria* ?

Absolute error ▼

< ▼

1e-10

20 x^3

Algebraic formula

20 x^3

https://youtu.be/kXplugYL9_4



07 Multiple correct answers Grading criteria

Part 1

Multiplying of two factors of -18

· = -18

Answer* ?

[18,-1]

☐ Grading criteria* ?

`_0*_1==-18`

Part 2

A number x that is a multiple of 7 and $40 < x < 50$.

$x =$

Answer* ?

42

☐ Grading criteria* ?

`_0==42 || _0==49`

Part 3

A number x that is a multiple of 7 and $6 < x < 16$.

$x =$

Answer type ?

Number

Random variables ?

`a={6:100:7};`

`n= {1,2,3};`

`d= {4,5,6};`

Answer* ?

`a+8`

ing variables* ?

`criterion1=_0 % 7==0;`
`criterion2= a<_0 && _0<a+10;`

☐ Grading criteria* ?

`criterion1 && criterion2`

<https://youtu.be/LV4ZBksjII8>

Moodle question bank Wiris question type



[The tools](#)

[Introduction to WIRIS quizzes](#)

[Moodle demo site](#)



01 Numbers- Biology

<https://docs.moodle.org/all/es/WIRIS>

A cell population doubles every 30 periods. Starting with 1000 cells, how many will be there after 300 periods?

Answer 1

$$1000 \cdot 2^{\frac{300}{30}}$$



Grade

100%

Correct answer

Validation

Variables

WIRIS toolbar with icons for fractions, powers, roots, parentheses, division, pi, alpha, and undo/redo.

$$1000 \cdot 2^{\frac{300}{30}}$$

WIRIS quizzes tour <https://youtu.be/zQiyQ8uyRM0>



02 Quantities and Units - Geometry

<https://moodle.org/plugins/view.php?id=26>

What's the radius of a disc of area 10 cm^2 ?

Correct answer

Validation

Variables

Allowed input

- ☐ **General** (formulas, expressions, equations, matrices...)
- ☒ **Quantity** (numbers, measure units, fractions, mixed fractions, ratios...)
- ☐ **Text** (words, sentences, character strings)

Answer:

$\frac{\square}{\square}$ $\square^\square$ $\sqrt{\square}$ $\sqrt[\square]{\square}$

$$\sqrt{\frac{10}{\pi}} \cdot 10^{-2} \text{ m}$$

Question 1

Correct

Mark 1.00 out of 1.00

Correct answer

Validation

Variables

$\frac{\square}{\square}$ $\square^\square$ $\sqrt{\square}$ $\sqrt[\square]{\square}$ $(\square)$ $\left(\begin{smallmatrix} \square & \square \\ \square & \square \end{smallmatrix}\right)$

$$\sqrt{\frac{10 \text{ cm}^2}{\pi}}$$

WIRIS quizzes tour <https://youtu.be/WU0eQv1dv2M>



03 Random variables - Geometry

<http://www.wiris.net/demo/wiris/manual/en/html/tour/equacions.html>

What's the radius of a disc of area 2?

What's the radius of a disc of area # a? I

Answer 1

$$\sqrt{\frac{\# a}{\pi}}$$



Grade

100%

Validation and variables

Comparison: Tolerance digits: 2

Variables: Has algorithm

Correct answer

Validation

Variables

Preview

WIRIS cas

Edit	Operations	Symbols	Analysis	Matrix	Units	Com
$\left[\right]$	$\{ \}$	$\ \cdot \ $	$\frac{\square}{\square}$	$\square^\circ$	$\sqrt{\square}$	Σ
$\left[\right]$	$\left \right $	$\square \square$	$\square_\circ$	$\sqrt[n]{\square}$	$\Sigma_{\dots}$	$\prod$

▲ variables ▲

$a = \text{random}(1, 10)$

WIRIS quizzes tour <https://youtu.be/WaxSONjI5lQ>



04 Simplification Calculations - Arithmetic

Calculate:

$$9 + 2 \cdot 5$$

Answer 1

#r



Grade

100%

Validation and variables

Comparison: Tolerance digits: 2

Properties: **is simplified**

Variables: Has algorithm

Additional properties

Structure:

none

More:

☒ is simplified

WIRIS cas

Edit Operations Symbols Analysis Matrix Units Comb

Operations toolbar showing various mathematical symbols and functions.

Correct answer

Validation

Variables

Preview

☐ Square brackets (vectors)

```
a=random(1,10)
b=random(2,5)
c=random(2,5)
r=a+b·c
```

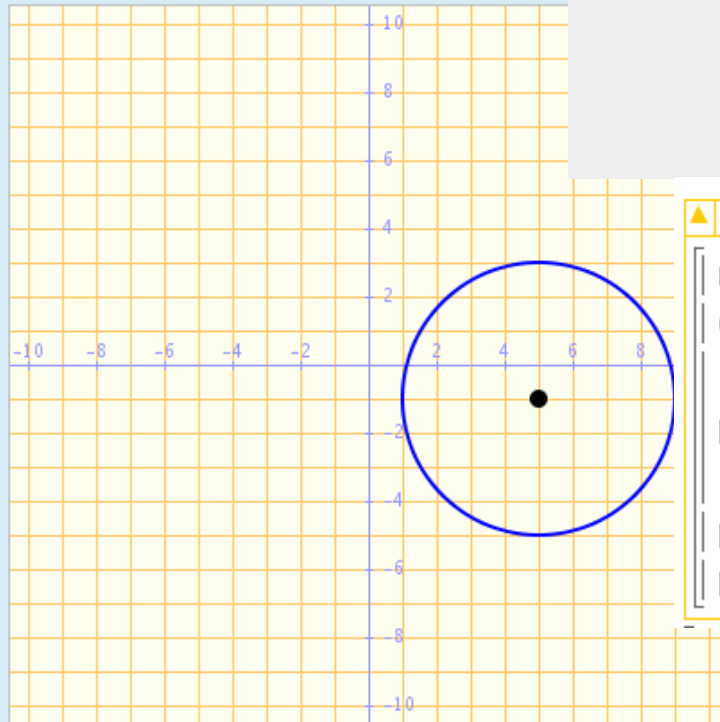


WIRIS quizzes tour <https://youtu.be/XkHCZnvSUM4>



05 Graphs- Plot- Coordinates

What's the radius of this circumference?



Answer 1

#r



Validation and variables

Comparison: Tolerance digits: 2

Variables: Has algorithm

▲ variables ▲

```
r = random(1,5)
c=point(random(-5,5),random(-5,5))
p=plotter(

|                   |
|-------------------|
| window_width=400  |
| window_height=400 |
| width=21          |
| height=21         |

)
plot(cfr(c,r),{line_width=2,color=blue})
plot(c,{point_size=10})
```

WIRIS quizzes tour https://youtu.be/mVW_Y7IEIc



06 Factorization- Algebra

Factorize the polynomial:

$$16 \cdot x^2 + 24 \cdot x - 4 \cdot y^2 + 9$$

Any correct answer is acceptable. The answer should not contain terms that can accept further factorize

Answer:

$$(4 \cdot x - 2 \cdot y + 3) \cdot (4 \cdot x + 2 \cdot y + 3) \quad \checkmark \quad \checkmark$$

Properties: is simplified, is factorized

Variables: Has algorithm

```
repeat
  a=random(2..7)
  b=random(2..7)
  c=random(2..7)
  p=(a·x+b)2-(c·y)2
  q=factor(p)
```

```
until a≠b∧b≠c
c1=c2
```

```
e0=string_substitution("(#1·x)2+2·#1·#2+(#2)2-#3·y2",a,b,c1)
e1=string_substitution("(#1·x+#2)2-#3·y2",a,b,c1)
e2=string_substitution("(#1·x+#2)2-(#3·y)2",a,b,c)
```

```
p → 49·x2+84·x-16·y2+36
e0 → (7·x)2+2·7·6+(6)2-16·y2
e1 → (7·x+6)2-16·y2
e2 → (7·x+6)2-(4·y)2
q → (7·x-4·y+6)·(7·x+4·y+6)
```

$$16 \cdot x^2 + 24 \cdot x - 4 \cdot y^2 + 9$$

Polynomial terms that do not contain y are a perfect square trinomial

$$(4 \cdot x)^2 + 2 \cdot 4 \cdot 3 + (3)^2 - 4 \cdot y^2$$

$$(4 \cdot x + 3)^2 - 4 \cdot y^2$$

This can also be written as the difference of two squares:

$$(4 \cdot x + 3)^2 - (2 \cdot y)^2$$

We factorize::

$$(4 \cdot x - 2 \cdot y + 3) \cdot (4 \cdot x + 2 \cdot y + 3)$$

So $16 \cdot x^2 + 24 \cdot x - 4 \cdot y^2 + 9 = (4 \cdot x - 2 \cdot y + 3) \cdot (4 \cdot x + 2 \cdot y + 3)$

The correct answer is: $(4 \cdot x - 2 \cdot y + 3) \cdot (4 \cdot x + 2 \cdot y + 3)$

<https://youtu.be/lxZISQ8hl7A>



07 Multiple sub questions -Probabilities

When throwing a fair dice, calculate the probability for each even

K: The outcome is 6

Λ : The outcome is a number greater than 3.

M: The outcome is a number lower than 2.

N: The outcome is an even number.

Write only the number in the gap, using simplified fractions.

w={1,2,3,4,5,6}

repeat

a1=random(1..6)

a2=random(1..6)

a3=random(1..6)

until a1 $\neq$ a2 $\wedge$ a2 $\neq$ a3

b=random({1,3,5})

c=random({2,4,6})

$$p1 = \frac{1}{6}$$

$$p2 = \frac{6-b}{6}$$

$$p3 = \frac{c-1}{6}$$

$$p6 = \frac{1}{2}$$

Answer:

$$P(K) = \frac{1}{6} \quad \checkmark \quad \checkmark$$

$$P(\Lambda) = \frac{1}{2} \quad \checkmark \quad \checkmark$$

$$P(M) = \frac{1}{6} \quad \checkmark \quad \checkmark$$

$$P(N) = \frac{1}{2} \quad \checkmark \quad \checkmark$$

$P(K) = \# p1$

$P(\Lambda) = \# p2$

$P(M) = \# p3$

$P(N) = \# p6$



☒ Compound answer

☐ All answers must be correct

☒ Distribute grade 25 25 25 25

The experiment sample space: $\Omega = \{1,2,3,4,5,6\}$

The probability of the event $K = \{x \in \Omega \mid x = 6\}$ is $P(K) = \frac{1}{6}$.

The probability of the event $\Lambda = \{x \in \Omega \mid x > 3\}$ is $P(\Lambda) = \frac{1}{2}$.

The probability of the event $M = \{x \in \Omega \mid x < 2\}$ is $P(M) = \frac{1}{6}$.

The probability of the event $N = \{x \in \{2,4,6\}\}$ is $P(B) = \frac{1}{2}$.

https://youtu.be/LdrDELHzQ_g



The Stemcollection and the Greek effort

In [Stemcollection](https://stemcollection.com) you will find a huge collection of questions, in a variety of languages and free to download.

Vasilis Palilis has contributed to this collection by publishing his own Greek questions. We hope to see soon your own questions in Stemcollection!

<https://stemcollection.com/om/57/el>

Moodle question bank Stack question type



[The Philosophy of STACK](#)

[Official User Documentation](#)

[STACK Demonstration site](#)



01 Input, Validation, Feedback, Potential Response Node, Question tests & deployed versions

https://docs.moodle.org/en/STACK_question_type

Differentiate $((x - 1)^3)$ with respect to (x) .

$3(x-1)^2$

Your last answer was interpreted as follows: $3 \cdot (x - 1)^2$

The variables found in your answer were: $[x]$

Correct answer, well done.

https://youtu.be/_oZpgXmGs60



02 Random questions, Functions, Question note

https://moodle.org/plugins/qtype_stack

Differentiate $((x - 1)^3)$ with respect to (x) .

Question variables ?

```
n : 2+rand(3);  
p : (x-1)^n;
```

$3 \cdot (x-1)^2$

Your last answer was interpreted as follows: $3 \cdot (x - 1)^2$

The variables found in your answer were: $[x]$

Correct answer, well done.

<https://youtu.be/HxkP2AiHMBg>



03 Multipart mathematical questions, Plot

Find the equation of the line tangent to $x^3 - 2 \cdot x^2 + x$ at the point $x = 2$.

1. Differentiate $x^3 - 2 \cdot x^2 + x$ with respect to x

Your last answer was interpreted as follows: $3 \cdot x^2 - 4 \cdot x + 1$

The variables found in your answer were: $[x]$

2. Evaluate your derivative at $x = 2$

Your last answer was interpreted as follows: 5

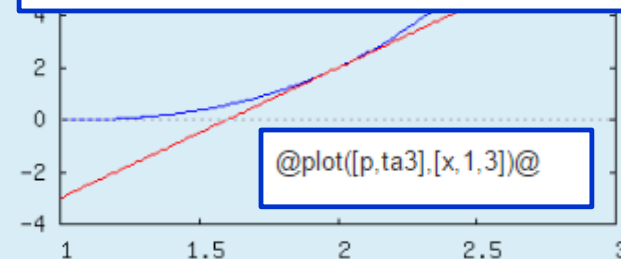
3. Hence, find the equation of the tangent line $y =$

Your last answer was interpreted as follows: $5 \cdot x - 8$

The variables found in your answer were: $[x]$

Question variables ?

```
p: x^3-2*x^2+x;  
pt: 2;  
ta1: diff(p,x);  
ta2: subst(x=pt,diff(p,x));  
ta3: remainder(p,(x-pt)^2);
```



<https://youtu.be/qMA6EjNUhLg>



04 Integration Feedback

Find $\int (x - 6)^3 dx$

Your last answer was interpreted as follows: x^2

The variables found in your answer were: $[x]$

Question variables ?

```
n:rand(5)+3;
a:rand(5)+3;
v:rand([x,t]);
p:(v-a)^n;
ta:(v-a)^(n+1)/(n+1);
```

Incorrect answer.

The derivative of your answer should be equal to the expression that you were asked to integrate, that was: $(x - 6)^3$. In fact, the derivative of your answer, with respect to x is: $2 \cdot x$ so you must have done something wrong!

We can either do this question by inspection (i.e. spot the answer) or in a more formal manner by using the substitution $u = (x - 6)$. Then, since $\frac{d}{dx} u = 1$ we have

$$\int (x - 6)^3 dx = \int u^3 du = \frac{u^4}{4} + c = \frac{(x-6)^4}{4} + c.$$

A correct answer is $\frac{(x-6)^4}{4} + c$ which can be typed in as follows:

We can either do this question by inspection (i.e. spot the answer) or in a more formal manner by using the substitution $u = (x - 6)$. Then, since $\frac{d}{dx} u = 1$ we have

$$\int (x - 6)^3 dx = \int u^3 du = \frac{u^4}{4} + c = \frac{(x-6)^4}{4} + c.$$

<https://youtu.be/qSrCrsx6Hjk>



05 Solving equation

A stone is thrown from the top of a building with an initial velocity of 40 m/s downward. The top of the building is 60 m above the ground. How much time elapses between the instant of release and the instant of impact with the ground?

Your last answer was interpreted as follows: $\frac{10 \cdot \sqrt{694} - 200}{49}$

```
v_i: rand([5,10,15,20, 30, 40, 50]);  
y_i: rand([50, 60, 70, 80, 90, 100])  
p: -4.9*t^2 - v_i*t + y_i  
eqn: -4.9*t^2 - v_i*t + y_i = 0;  
tt: part(solve(eqn,t),2,2);
```

Correct answer, well done.

Your last answer was interpreted as follows: 1.29466

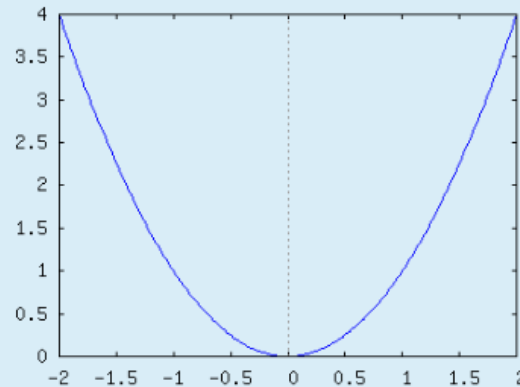
<https://youtu.be/rHXjV79-dTg>



06 A multiple choice question

```
/* Create a list of potential answers. */
p:2*x^2;
ta:[[p/2,true],[p,false],[int(p,x),false],[diff(p,x),false]]
/* The actual correct answer. */
tac:p/2
/* Randomly shuffle the list "ta". */
ta:random_permutation(ta);
/* Add in a "None of these" to the end of the list.
tao:[null, false, "None of these"];
ta:append(ta,[tao]);
```

Below is a sketch of a graph. Select the algebraic expression which represents it.



- ☐ Not answered
- ☐ $4 \cdot x$
- ☐ $2 \cdot x^2$
- ☐ $\frac{2 \cdot x^3}{3}$
- ☒ x^2
- ☐ None of these

@plot([tac],[x,-2,2])@

Your last answer was interpreted as follows: x^2

The variables found in your answer were: $[x]$

<https://youtu.be/IWbRQGXYDa8>



07 Matrix

Calculate $\begin{bmatrix} 2 & 2 \\ 6 & 3 \end{bmatrix} \cdot \begin{bmatrix} 2 & 6 \\ 6 & 6 \end{bmatrix}$

$\begin{bmatrix} 16 & 24 \\ 30 & 54 \end{bmatrix}$

Your last answer was interpreted as

```
A:ev(rand(matrix([5,5],[5,5]))+matrix([2,2],[2,2]),simp);
B:ev(rand(matrix([5,5],[5,5]))+matrix([2,2],[2,2]),simp);
TA:ev(A,B,simp);
TB:ev(A*B,simp);
BT:transpose(B);
C:zeromatrix (first(matrix_size(A)), second(matrix_size(A)));
S:for a:1 thru first(matrix_size(A)) do for b:1 thru second(matrix_size(A)) do
C[ev(a,simp),ev(b,simp)]:apply("+",zip_with("?",A[ev(a,simp)],BT[ev(b,simp)]));
D:ev(C,simp);
C:C;
```

Correct answer, well done.

To multiply matrices A and B we need to remember that the (i, j) th entry is the scalar product of the i th row of A with the j th column of B .

$$\begin{bmatrix} 2 & 2 \\ 6 & 3 \end{bmatrix} \cdot \begin{bmatrix} 2 & 6 \\ 6 & 6 \end{bmatrix} = \begin{bmatrix} 16 & 24 \\ 30 & 54 \end{bmatrix} = \begin{bmatrix} 16 & 24 \\ 30 & 54 \end{bmatrix}.$$

A correct answer is $\begin{bmatrix} 16 & 24 \\ 30 & 54 \end{bmatrix}$.

https://youtu.be/Ol0e3j_72FY



Questions?

Vasilis Palilis

Instructional & Moodle Course Designer

@ [learn-era.gr](https://www.learn-era.gr) & [wideservices.gr](https://www.wideservices.gr)

Moodle Mentor Assessor @ [widetraining.gr](https://www.widetraining.gr)

Certified Adult educator

Physicist & Teacher

