

Types of angle

Recommended grade: 6.

Object of activity: Differentiation between angles according to type: acute angle, right angle, obtuse angle, and straight angle

Target language: *Acute angle, right angle, obtuse angle, straight line / straight angle*

Aids: Cards with angle sizes and bag, blackboard

Time allowed: 10 minutes

- We familiarize the students with the object of the game, with the rules, and the expressions used: *acute angle, right angle, obtuse angle, straight line*, which we write above the four columns on the blackboard.
- We prepare cards in advance, on which the size of the angle is given in degrees, and we place them in the bag. There must be at least as many cards as there are students and there should be the same number of cards showing every type of angle, or possibly one extra e.g. for 22 students we need five complete sets of four and one extra card showing an acute angle and one extra card showing a right angle.

Note: If the number of students is not divisible by four, then the incomplete groups shall also present its missing members.

- Each student draws a card and represents an angle of a given size.
- He/she must not disclose the number on the card to anyone.
- The students walk round the classroom and ask each other, e.g.: "*Are you an acute angle?*"
- Nobody else should hear the questions and answers.
- The goal is to form groups of four students, where each of them represents a different type of angle.
- Lastly, each student "presents" their angle aloud, e.g.: "*An angle of 162 degrees is an obtuse angle.*" He/she writes the size of the angle on the blackboard next to the corresponding expression.

Classroom language:

Are you an acute/right/obtuse/straight angle?

An angle of 162 degrees is an obtuse angle.

Jsi ostrý/pravý/tupý/přímý úhel?

Úhel 162° je tupý úhel.

Reading, writing, and comparing decimal numbers

Recommended grade: 6.

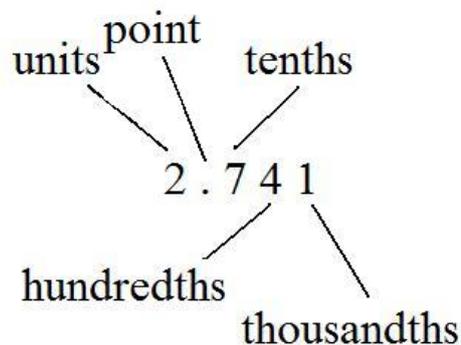
Object of activity: Reading, writing, and comparison of decimal numbers

Target language: *Units, tenths, hundredths, thousandths*; grading adjectives, *small, large*

Aids: Worksheets A and B

Time allowed: 15 minutes

- Initially, students are familiarized with the names of individual decimal places in English:



- Students working in pairs receive two versions of worksheets, version A and version B.
- Each student reads his/her number to his/her neighbour and the latter writes it in the first or third column of the table in the worksheet (depending on version).
- After they have written down all the missing numbers, they fill in the symbols $<$, $>$, $=$ in the centre column and complete the remaining tasks on the worksheet.
- They compare their results with those of the other pairs.

Classroom language:

Version A: Read the decimals from the first column to your neighbour.

Version B: Read the decimals from the third column to your neighbour.

Write the decimals down in the chart.

Write the signs greater than, less than, equal to.

Compare your results with the others.

Verze A: Přečti desetinná čísla z prvního sloupce svému sousedovi.

Verze B: Přečti desetinná čísla ze třetího sloupce svému sousedovi.

Zapište desetinná čísla do tabulky.

Doplňte znaménka větší než, menší než, rovná se.

Své výsledky porovnej s ostatními.

Ratio and percentage

Recommended grade: 7.

Object of activity: To write down a ratio as a fraction and to express it as a percentage

Target language: See worksheet; *ratio, fractions, percentage*

Aids: Worksheets, blackboard

Time allowed: 15 minutes

- The students who fill in a questionnaire with ten questions first, win (part A of the worksheet).
- We prepare a table on the blackboard with ten rows and three columns. The first column contains the numbers from the questionnaire from 1 to 10.
- When the students have completed the answers, we jointly fill in the number of positive answers in the second column and the number of negative answers in the third column.
- Using data from the table, the students complete the remaining tasks B and C on the worksheet.
- Lastly, we jointly check the results, paying attention to the correct pronunciation of fractions, ratios, and percentages.

Classroom language:

Fill in the questionnaire. Tick yes or no.

Write down all ratios and fractions.

If the number of answers is 27 and the ratio is 12 : 15, then fractions are $\frac{12}{27}$ and $\frac{15}{27}$.

What percentage of you...?

12 : 15 the ratio of twelve to fifteen

$\frac{12}{27}$ twelve twenty sevenths

35 % thirty five percent

Vyplňte dotazník. Zaškrtněte ano, nebo ne.

Zapište všechny poměry a zlomky.

Pokud je počet odpovědí 27 a poměr je 12 : 15, potom zlomky jsou $\frac{12}{27}$ a $\frac{15}{27}$.

Kolik procent z vás...?

12 : 15 poměr dvanáct ku patnácti

$\frac{12}{27}$ dvanáct sedmadvaceti

35 % třicet pět procent

Map scale

Recommended grade: 7.

Object of activity: Estimation of distance working with a map

Target language: *Scale, ratio, distance, map, approximate estimation, in a straight line (air line)*

Cross-curricular relationships: Geography, ICT

Aids: Wall map of the Czech Republic., tape measure, worksheet, school atlases, rulers, Internet source, *Google Earth* program

Time allowed: 45 minutes

- The instructor repeats the ratio arithmetic expressing ratios in simplest terms, increasing and decreasing in a given ratio.
- We emphasize that we will always be measuring distances during the lesson using a so-called straight line.
- The students first estimate the distances of cities and record them in the worksheet.
- Next, they measure the exact distances of the first eight (cities) using their atlases and the last two using the wall map. They again write the data into their worksheet, always including the map scale.
- They calculate the actual distance, using the scale.
- That check the calculated values using the measure of distance feature in the *Google Earth* programme, individually, or jointly with the teacher.
- The students determine the variance between their estimates and the actual distances. They add the number of kilometres by which their estimates differed from actual distances. The students may comment: *"I estimated that the distance between Prague and Liberec was 130 km, but it is 115 km, so I was about 15 km out."*
- Lastly, we announce which students made the most accurate estimates.

Classroom language:

Estimate the distances and write them on the worksheet.

Find out the scale of the map and write it down.

Measure the distances on the map, and using the scale, find the real distances.

How different are your estimations from the reality?

The most accurate estimation.

Odhadněte vzdálenosti a zapište je do pracovního listu.

Zjistěte měřítko mapy a zapište ho.

Změřte vzdálenosti na mapě a pomocí měřítka zjistěte skutečné vzdálenosti.

Jak moc jsou rozdílné vaše odhady od skutečností?

Nejpřesnější odhad.

Fractions, decimal places and equivalent percentages

Recommended grade: 7.

Object of activity: Understanding relationships between ratios, decimal places, and percentages

Target language: *Fraction, decimal, percentage*

Aids: Cards with numerical values, data projector, blackboard

Time allowed: 10 minutes

- We write *FRACTIONS* on one piece of large-format paper, on the second *DECIMALS* on the second and *PERCENTAGE* on the third and post them in the class at an adequate distance from one another.
- We hand out cards with values to the students. They divide themselves into three groups according to whether they have a fraction, decimal number, or percentage. They stand by the corresponding sign.
- Each student group reads his/her value on the card correctly.
- We provide an example on the blackboard of such a triad where the values are equal (we can use the first row from the table, or an entirely different example).
- The students then form a fraction triad, namely, decimal number, percentage, whose value is equal; *“Form groups of three so that your fraction, decimal and percentage are all equal.”*
- While the students are looking for partners to form a triad, we prepare a table with correct answers.
- When the students have finished (a time limit should be set), we display the table using a data projector, or we have it prepared on the blackboard and we check jointly with the class, whether it is correct.

Classroom language:

If you've got a fraction on your card, go to the big FRACTION card.

If you've got a decimal on your card, go to the big DECIMAL card.

If you've got a percentage on your card, go to the big PERCENTAGE card.

Please, read your number.

These are equal.

Get into groups of three so that your fraction, decimal and percentage are all equal.

Pokud máte na kartičce zlomek, jděte k velké kartě ZLOMKY.

Pokud máte na kartičce desetinné číslo, jděte k velké kartě DESETINNÁ ČÍSLA.

Pokud máte na kartičce procento, jděte k velké kartě PROCENTA.

Prosím, čtěte své číslo.

Tyto jsou rovnocenné.

Vytvořte skupiny po třech tak, že zlomek, desetinné číslo a procento se rovnají.

Correct answers:

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50 %

$\frac{1}{4}$	0.25	25 %
$\frac{1}{10}$	0.1	10 %
$\frac{1}{1}$	1.0	100 %
$\frac{3}{4}$	0.75	75 %
$\frac{2}{3}$	0.67	67 %
$\frac{3}{8}$	0.375	37.5 %
$\frac{4}{5}$	0.8	80 %

Supplementary activity 1:

Students mark fractions, decimal numbers and percentages on a grid, so that the coloured part corresponds to the given numerical value, while the grid shall be a single entity.

Supplementary activity 2:

The students convert the coloured part of the shape they received into fractions (recorded as fractions) as instructed or they colour the part of the shape according to the specified fraction.

Equivalent fractions – Bingo

Recommended grade: 7.

Object of activity: Practice of the simplification of fractions using the game Bingo

Target language: *Simplify, fraction, equivalent fraction*

Aids: Table with simplified fractions, cards with un-simplified fractions, bag, blackboard, or data projector

Time allowed: 10 minutes

- We can either magnify the table with the simplified fractions on A3 paper and tape it to the blackboard, rewrite it on the blackboard, or use the data projector.
- We cut up the non-simplified fractions on individual cards and place them in a bag.
- We ask the students to sketch a square table on the paper. Their individual pages comprise three identical small squares; the whole table containing nine squares. The students randomly select nine fractions from the next table, i.e. with the simplified fractions on the blackboard and write them into their table: *“Draw a table of three by three squares, choose nine fractions from the board and write them down in your table.”*
When the students have finished, we explain the next procedure. We show them a bag and tell them that it contains non-simplified fractions: *“In this bag there are non-simplified fractions.”* To demonstrate this, we pull out a card, read the fraction, or even show it to them if necessary (depends on the language ability of the given class), and ask them to say how the fraction looks when simplified: *“What is the simplified form of this fraction?”* When the students answer, we ask them if they have this fraction in their table: *“Is it in your table?”* If so, they cross it out: *“If so, cross it out.”* If not, they do nothing (classic Bingo).
- The student who crosses out all of the fractions in his/her table first, shouts *“Bingo!”*
- Lastly, we jointly go through all of the answers.

Classroom language:

*Draw a table of three by three squares, choose nine fractions from the board and write them down in your table.
In this bag there are un-simplified fractions.*

What’s the simplified form of this fraction?

Is it in your table?

If so, cross it out.

When you cross out all the fractions in your table, call out Bingo.

Načrtněte si tabulku tři krát tři čtverečky a vyberte si devět zlomků z tabule a napište je do tabulky.

V tomto sáčku jsou nezkrácené zlomky.

Jaká je zkrácená podoba tohoto zlomku?

Je ve tvé tabulce?

Pokud ano, přeškrtněte ho.

Až přeškrtnete všechny zlomky ve své tabulce, vykřikněte

Table with simplified fractions:

1/5	2/3	3/4	3/5
3/8	5/7	1/4	2/9
2/7	5/9	4/7	4/11
6/7	1/6	1/8	6/11

Table with non-simplified fractions and correct answers:

10/14 5/7	9/12 3/4	6/10 3/5	32/88 4/11
30/55 6/11	3/18 1/6	40/70 4/7	12/32 3/8
4/20 1/5	42/49 6/7	8/36 2/9	10/35 2/7
8/64 1/8	20/30 2/3	2/8 1/4	15/27 5/9

Fractions in everyday life

Recommended grade: 7.

Purpose of activity: Practice of adding fractions

Target language: *Fractions*

Aids: Allocation of tasks, blackboard

Time allowed: 15 minutes

- Divide the students into groups.
- Read the first task. We can write the fractions on the blackboard to improve understanding and retention. We read out the task slowly several times.
- The group answering first and correctly is awarded a point (we record the points on the blackboard).
- We do the same for the tasks which follow.
- The group with the highest number of points for correct and quick answers wins.

1) Two pizzas are cut into 5^{ths} . Mrs East eats $\frac{2}{5}$ of the ham and pineapple pizza and $\frac{3}{5}$ of the mushroom pizza. How much did she eat altogether?

$\frac{5}{5}$ of the pizza = 1 pizza

2) Three cakes are cut into 8^{ths} . Mrs Smith ate $\frac{2}{8}$ of the chocolate cake, Mrs Evans ate $\frac{4}{8}$ s of the carrot cake and Mrs Scott ate $\frac{3}{8}$ of the lemon cake. How much cake was eaten altogether?

$\frac{9}{8}$ of the cake

3) Two loaves of bread are sliced into 12ths. $\frac{3}{12}$ of the granary and $\frac{3}{12}$ of the wholemeal bread was made into sandwiches. How much bread was used?

$\frac{6}{12}$ of the loaves = $\frac{1}{2}$ of bread or 1 loaf

4) Two apple pies are sliced into total of 10 slices. $\frac{2}{10}$ of one apple pie was eaten with custard, and $\frac{7}{10}$ of the other apple pie was eaten with cream. How many pieces of apple pie are left?

1 piece

5) If a running track is $\frac{1}{4}$ of a kilometre long, what is the total distance a runner traverses, if he runs around the track four times?

1km

Alternative:

We copy the tasks, cut them up, and divide the students into groups. Each group receives the same task Groups finding the correct answer first, win.

Whole numbers (integers) – casino

Recommended grade: 7.

Object of activity: Addition and subtraction of integers

Target language: *Integers, negative numbers, natural numbers, addition, subtraction*

Aids: Blackboard, worksheet with crossword puzzle and game sheet (can be copied double-sided onto A4 paper), glue

Time allowed: 15–20 minutes

- We introduce the object of the lesson to the students, namely, practising adding and subtracting integers. We review the meaning of integers (whole numbers).
- We distribute worksheets to the students with integer addition and subtraction problems, including the results, not all the results being correct.
- The students must decide which result is correct and which is not. If they believe that the result is wrong, they write the correct one next to it. *“Decide if the result is correct or not. If the result is ok, tick the box ‚good‘. If there is a mistake, tick the box ‚no good‘, and write down the correct answer.”* The same problems, although with the correct answers, are also written on the blackboard, but the students must not see them yet.
- On the line under the word *bet* the students write how much they wish to bet on the correct result. If they are sure of the answer, they bet a lot (max. 100 points); if they are unsure, they bet less (min. 10 points): *“Write down your bet on the bet line. If you are confident, bet a lot. If you aren’t so confident, bet a little.”*
- When they are ready, we uncover the problems with the correct results on the blackboard and the students check their answers: *“Check to see if you were correct.”*
- For every correct answer, the student adds the points that he/she originally bet on the correct result in his/her 100-point opening bet. *“If you were correct, add the amount you bet to your total score.”* For every incorrect answer, the student shall subtract the points that he/she originally bet on the correct result in his/her 100 point opening bet: *“If you were wrong, subtract the amount you bet from your total score.”*
- The student with the highest number of points, wins.

Note: If any students lose all their points or if they have a negative number, we can lend them an additional 100 points; at the end of the game, but they must give us back 200 points.

Classroom language:

Decide if the result is correct or not.

If the result is ok, tick the box under „good“.

If there is a mistake, tick the box under „no good“ and write down the correct answer.

Write down your bet on the bet line.

If you are confident, bet a lot.

If you aren’t so confident, bet a little.

Rozhodněte, zda je výsledek správný.

Pokud je výsledek v pořádku, zaškrtněte políčko pod „správný“.

Pokud je tam chyba, zaškrtněte políčko pod „nesprávný“ a napište správnou odpověď.

Zapište svou sázku do řádku sázek.

Pokud jste si jistí, vsaďte hodně.

Pokud si nejste příliš jistí, vsaďte málo.

*Check to see if you were correct.
If you were correct, add the amount of your bet to your total score.
If you were wrong, subtract the amount of your bet from your total score.*

Zkontrolujte, zda jste měli pravdu.
Pokud jste měli pravdu, připočítejte sázku ke svým celkovým bodům.
Pokud jste se zmýlili, odečtete sázku od svých celkových bodů.

Supplementary activity:

We prepare a crossword puzzle with a mystery word for the students, in which they write the correct results in words; that is, e.g. if the result is -5 , they will write *minus five* into the crossword puzzle.

Note: The letters contained in the mystery word must be below one another in the crossword puzzle.

Correct answers:

Results: The results recorded in the crossword puzzle,
mystery word: **WEDNESDAY**

- | | | |
|----|-----------------|--------------------------------------|
| 1. | -12 | minus t welve |
| 2. | 0 | z e ro |
| 3. | 350 | three hundred d and fifty |
| 4. | -2 | mi n us two |
| 5. | -53 | minus fifty thr e e |
| 6. | -5 | minu s five |
| 7. | 150 | one hundred d and fifty |
| 8. | -112 | minus one hundred a nd twelve |
| 9. | -37 | minus thirt y seven |

Three-dimensional geometric shapes – pexeso

Recommended grade: 6.–7.

Object of activity: Figure differentiation

Target language: *Cube, cuboid, cylinder, pyramid, sphere, cone*

Aids: Cards with words and 3D geometric shapes

Time allowed: 10 minutes

- We familiarize the students with the English names of figures. The use of cards with illustrated figures and cards with names of figures would be appropriate. We match the figure with its name as a class and ensure that they are correctly pronounced.
- We divide the students into groups and provide each group with a sheet with cards to be cut up. The students quickly cut up the cards, mix them up and play classic pexeso (mix and match). As in the introduction, they search for the name corresponding to the picture of the figure. When the card is turned over, they read the word and name the figure.

Classroom language:

Match a name to each 3D shape.

Please, cut out the cards and shuffle them.

Place them on the table face down.

Read the word / name of the shape every time.

Přiřaď 3D tvar k jeho názvu.

Prosím, nastříhejte karty a zamíchejte je.

Položte je na lavici lícovou stranou dolů.

Pokaždé přečtete slovo / pojmenujte tvar.

Circle the correct number

Recommended grade: 6.–9.

Object of activity: Circling the correct number drawn

Target language: Numbers

Aids: Blackboard, starting line, list of numbers, chalk

Time allowed: 10 minutes

- We write various numerals across the whole blackboard (their degree of difficulty depends on the students' level of knowledge).
- The students divide into a maximum of two or three teams. We mark a chalk line on the floor from which individuals will start racing to the board.
- The instructor calls out the numbers or asks a student to stand beside the blackboard and read numbers out at random.
- When the first number is called, the first person in each team runs to the blackboard and tries to be the first to circle the called number.
- He/she goes back to his/her team, hands the chalk to the next person in line and that person runs to the blackboard to circle the number next called, etc.
- The team circling the highest number of correct numbers, wins.

Classroom language:

*When the first number is called,
the first person in each team runs forward
and tries to be the first to circle the correct
answer.*

*Hand the chalk to the next team member,
then go to the back of your team's line.*

Když je vyvoláno první číslo,
první z každého týmu běží vpřed,
aby jako první zakroužkoval
správnou odpověď.

Dejte křídu dalšímu v týmu a poté si
stoupněte na konec řady svého týmu.

Alternative:

We create a set of numbers for each team. The teams stand directly near the blackboard; as soon as a member from a team circles the correct answer, the next number is called. We do not wait for anyone. The team circling all the numbers called first, wins.

The perimeters of a triangle and a quadrangle

Recommended grade: 6.

Object of activity: Practice of calculation of the perimeter of a triangle and a quadrangle

Target language: *Perimeter, side, vertex (pl. vertices), square, rectangle, triangle, rhombus, rhomboid, trapezoid, sketch, formula, calculation; grading adjectives*

Aids: Blackboard, worksheets, drawing materials, scissors, quarts paper, bag

Time allowed: 20–25 minutes

- We review alongside the class, the units of *length*, names and characteristics of various geometric figures and how to calculate their perimeter.
- The students individually complete the worksheet. Then they exchange it with a classmate who checks the answers. We then jointly check the answers, write them on the blackboard and read them in English.
- The students sketch two figures of their choice of various dimensions and them out.
- They mix up all of the figures and place them in a bag. Each student shall pull out two figures from the bag, measure them and calculate their perimeters. They write the perimeters on the figures.
- The students stand in a circle and introduce their figure to the others. He/she name the figure and state its perimeter, all in English. For example: *“This is a square / I’ve got a square. Its perimeter is / The perimeter of my square is 23 centimetres.”*
- The student then places the figure on the floor in a line according to the type and size of its perimeter, creating a line of triangles, squares, rectangles, etc. The figures in each line are arranged according to size.
- Lastly, the students compare the figures in individual rows, e.g.: *“My rectangle has got the second longest perimeter.”*

Classroom language:

This is a square / I’ve got a square.

Its perimeter is / The perimeter of my square is 23 centimetres.

Compare these geometrical shapes.

My rectangle has got the second longest perimeter.

Toto je čtverec / Já mám čtverec.

Jeho obvod / Obvod mého čtverce je 23 cm.

Porovnejte tyto geometrické tvary.

Můj obdélník má druhý nejdelší obvod.

Supplementary activity:

The students can arrange a large picture from the figures, or from several smaller pictures.

Rounding off natural numbers

Recommended grade: 6.

Object of activity: Practice in rounding-off natural numbers to tens

Target language: *Rounding, tens, units, rule, round up, round down, numbers*

Aids: Blackboard, magnetic table, magnets, cards with natural numbers (see attachment), alarm clock

Time allowed: 15–20 minutes

- We repeat the basic rules of rounding off natural numbers to the nearest ten to the students. If our knowledge of English permits, we try to repeat the rules for rounding-off in English (we have the number 48 on the card): *“We want to round 48 to the nearest ten. Is 48 nearer to 40 or 50? It’s nearer to 50, so 48 rounded to the nearest ten is 50. What is the rule? When do we round up? When do we round down? We round up if units are 5, 6, 7, 8, 9; we round down if units are 4, 3, 2 or 1.”*
- We write a numerical axis from 10 to 100 on the blackboard; we highlight the numerals from the order of tens 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.
- We place the card with the number 48 on the numerical axis.
- We distribute cards with a numbers to each student and he/she places it on the numerical axis.
- If we have enough space in the classroom, we ask the students to sit in a circle.
- We set the time on the alarm clock.
- We let the card with the number circulate (we can use more than one card).
- When the alarm rings, the student holding the card in his/her hand must read the number in English and correctly round it off. The others repeat both of the numbers after him/her.
- If he/she correctly rounds it off and reads it in English, he/she receives a reward. If not (even if it is correctly rounded off, but incorrectly read), the card circulates further until the alarm clock rings again.

Classroom language:

We want to round 48 to the nearest ten.

Is 48 nearer to 40 or 50?

It’s nearer to 50, so 48 rounded to the nearest ten is 50.

What is the rule?

When do we round up?

When do we round down?

We round up if units are 5, 6, 7, 8, 9;

we round down if units are 4, 3, 2 or 1.

Chceme zaokrouhlit 48 k nejbližší desítce.

Je 48 blíže k 40 nebo 50?

Je blíže k 50, takže 48 zaokrouhleno k nejbližší desítce je 50.

Jaké je pravidlo?

Kdy zaokrouhlujeme nahoru?

Kdy zaokrouhlujeme dolů?

Zaokrouhlujeme nahoru, když jsou jednotky 5, 6, 7, 8, 9, a dolů, když jsou jednotky 4, 3, 2 a 1.

Two-dimensional geometric shapes – loop

Recommended grade: 6.–7.

Object of activity: Differentiation and naming of two-dimensional figures

Target language: *Domino, square, circle, rectangle, ellipse, triangle, pentagon, hexagon, rhombus*

Aids: Worksheet, shapes cut out of paper, cards with illustrated shapes, blackboard

Time allowed: 15 minutes

- We familiarize the students with the English names of two-dimensional figures. As a simple aid, we use shapes cut out of coloured paper, which we then place on the blackboard and the students match their English names.
- After the students have familiarized themselves with the names of shapes, we cover up the aid, or take it down.
- We divide the students into pairs and hand out the cards to them. They place the cards together, so that the name of the figure and the corresponding two-dimensional figure are next to one another. A picture of the figure with the name on the card remains on the last card we began the game with. If not, the players must go through all of the cards and find the mistake.
- When the game is over, we name the figures again.

Word problems – scavenger hunt

Recommended grade: 8.–9.

Object of activity: Practice of word problems (repetition)

Target language: See problem texts

Aids: Cards with problems (see worksheet), writing materials, paper for rough calculations, classroom area

Time allowed: 15-30 minutes (according to the number of problems , mystery word being chosen at random)

- Students divide into small groups.
- We place the cards with problems randomly around the classroom. If the weather is good, we can play the game in a park or in the school yard.
- The cards contain problems the students must solve. In the top left-hand corner is a number corresponding to the answer of a problem on a different card. The top right-hand corner always contains one letter from the mystery word.
- Each group selects a problem to start with and stand there. This will prevent groups from pushing their way to a single card.
- They record the solution of the problem and the letter from the right corner on a piece of paper.
- Then they move to the card with the number they calculated in the previous problem.
- They continue in this fashion, until they have solved all the problems. The last problem will return them to the first problem.
- They solve the mystery word by arranging the combination of letters from the right-hand corner.
- The group solving the mystery word first and all whose results are correct, wins.

Mystery word:

PYTHAGORAS

Decimal system

Recommended grade: 8.

Object of activity: Practice of recording in the decimal system

Target language: *Decimal system, contracted notation, extended notation, equals, pair*

Aids: Cards with numbers in contracted notation and in extended notation of the decimal system (see worksheet), hat or bag

Time allowed: 10 minutes

- We prepare cards with numbers both in contracted notation and in extended notation of the decimal system.
- The students draw cards with numbers in extended notation from the hat or bag. Each student draws three to five numbers.
- We crumple up the cards with numbers in contracted notation and throw them around the class.

Note: Numbers may be repeated; the number of contracted notation numbers must equal the number of extended notation numbers. To make it more difficult, there should be numbers placed around the class, which do not fit into either category.

- The students search round the classroom for their numbers in contracted notation. They leave the numbers they do not need lying down. They place the corresponding pairs of numbers together on their desk. The person matching his/her numbers together first, wins.
- Lastly, everyone reads his/her pair of numbers.

Classroom language:

*Write down three / four / five numbers.
Your numbers are in an extended notation.
The other numbers are in a contracted notation.
Be careful, there are also numbers which don't match with anything.
Find the number that matches yours.*

*Vylosujte si tři / čtyři čísla / pět čísel.
Vaše čísla jsou v rozšířeném zápisu.
Ostatní čísla jsou ve zkráceném zápisu.
Pozor, jsou zde také čísla, která neodpovídají žádnému ze zadání.
Najděte číslo, které tvoří pár s vaším číslem.*

Alternative 1:

Instead of using numbers in extended notation, the students draw numbers in contracted notation.

Alternative 2:

The game can be used to practice other mathematics topics, e.g. divisibility, common multiples, comparison of numbers, volumes, perimeters (values or equations), etc.

Square roots

Recommended grade: 8.

Object of activity: Practice of finding square roots of numbers up to 20

Target language: *Root (of a number), square root (of), third root (of)*

Aids: Smallish soft ball

Time:allowed 10 minutes

- We throw the ball to a particular student and give him/her a problem to solve.
- The student provides his/her answer and throws the ball back to us.
- If the student gives the wrong answer, he/she must forfeit a point. The student recovers it, if he/she solves a mathematical problem the teacher or a classmate has provided.

Classroom language:

T: *The square root of nine is...*

Druhá odmocnina z devíti jsou...

S: *The square root of nine is three.*

Druhá odmocnina z devíti jsou tři.

Give me a forfeit.

Dej mi fant.

Alternative:

We throw the ball among the students and the student who catches it must solve the problem. After the student has answered, he/she throws the ball to one of his/her classmates and gives him/her a problem. We continue this way, until all the students in the class have had a turn.

Supplementary activity 1:

We give the problems of solving square roots of fractions, or of decimal numbers.

For example: $\sqrt{\frac{16}{25}}$; $\sqrt{0,0004}$; ...

Supplementary activity 2:

We provide problems for partially solving the square roots of natural numbers.

For example: $\sqrt{50}$; $\sqrt{12}$; ...

Pythagoras theorem – length of the hypotenuse

Recommended grade: 8.

Object of activity: Practice of calculations using the Pythagoras theorem

Target language: *Right-angled triangle, hypotenuse, leg, root of (a number), power of two*

Aids: Cut-out right-angle triangles with lengths of hypotenuses, free area on the floor, wall, or blackboard, numbers

Time allowed: 15 minutes

- We lay out the cut-out triangles on the classroom floor. If there is not enough space in the classroom, we fasten the triangles on the blackboard and wall using self-adhesive plasticine.
- We allot to the students numbers representing the length of the hypotenuses (orally or in writing).
- The students walk round the classroom and look for the triangle whose hypotenuse is the same as their allotted number, e.g. the student with number 7 selects the triangle with legs $\sqrt{3}$ and 2.

Note: We set a time limit for the task.

- The student who finds the corresponding triangle first, receives a point. If one of the students cannot find the corresponding triangle within the time limit, a classmate who has already found his/her triangle, can help.
- Lastly, the students shall justify why they chose this triangle in particular: *“The square root of three squared plus two squared equals seven, so the length of the hypotenuse is $\sqrt{7}$.”*

Classroom language:

Find a triangle whose length of the hypotenuse is equal to the number you have got.

The square root of three squared plus two squared equals seven, so the length of the hypotenuse is square root of seven.

Najděte trojúhelník, jehož délka přepony je stejná jako číslo, které jste dostali.

Druhá odmocnina ze tří na druhou plus dvě na druhou se rovná sedm, takže délka přepony je druhá odmocnina ze sedmi.

Right-angled triangle – crossword puzzle

Recommended grade: 8.

Object of activity: Calculation of the lengths of the sides of a right-angled triangle

Target language: *Triangle, hypotenuse, leg (of a right triangle), length*

Aids: Worksheet, calculator, cards

Time allowed: 15 minutes

- Students work in pairs.
- Each pair receives a worksheet with a task.
- Pairs work together on calculating the length of the individual sides of the triangle (one student may calculate and fill the results in the table horizontally and the other vertically).
- The students round off the results to the nearest whole number. A time limit is set.

Note: If necessary, we first repeat the Pythagoras theorem in the mother tongue and the equation for calculating the length of the sides.

- When a pair has completed the table, it compares its results with those of the other pairs. We encourage the students to speak English (essentially, they only read numbers).
- We then jointly check the results. The students say, e.g. *“One across is one. The length of the hypotenuse is one.”*

Classroom language:

Complete the number grid by filling in the correct number. Za x dosadíte správnou hodnotu a číslo doplňte do tabulky.

Round x to the nearest whole number. Zaokrouhlete x na nejbližší celé číslo.

You can use a calculator. Můžete použít kalkulačku.

Compare your answers with the others. Porovnejte své výsledky s dalšími dvojicemi.

One across is one. Jedna vodorovně je jedna.

The length of the leg is one. Délka odvěsny je jedna.

Alternative:

Half the students receive a triangle from the worksheet on the card (we prepare them in advance). The other half receives cards with the correct result. The students must form pairs such that the triangle finds its missing length of leg or hypotenuse, as applicable.

Statistics

Recommended grade: 9.

Object of activity: Acquisition of data and their statistical processing to form a conclusion of the investigation

Target language: *Data, statistics, statistical set, mode, median, arithmetical/geometrical average, processing of data*

Aids: Three questions, spreadsheets on a computer (*Excel*), interactive table data projector

Time allowed: 15 minutes

- We give the students the task of answering three questions from the questionnaire from five other classmates, family members, or friends. We either use the questions from the classroom language (see below), or we use our own.
- The students prepare a table in *Excel*, in which they progressively enter the acquired data. They either work with the table directly on the computer, or on paper.
- We then jointly process the data, preferably using an interactive table or data projector.
- Based on material covered, the students determine the arithmetical average, the geometrical average, the mean, the median and then comment on it in English: "*The arithmetic average is...*"
- The final assignment is arriving at a conclusion and summarizing the investigation. We use the mother or a foreign tongue, depending on the language ability of the students.

Classroom language:

How old are you?

How many brothers and sisters have you got?

What grade did you get

in math in your last school report?

Process the data, please.

Determine the arithmetic/geometrical average, mode, median...

Kolik je ti let?

Kolik máš sourozenců?

Jakou známku z matematiky jsi měl/a na posledním vysvědčení?

Zpracujte data, prosím.

Určete aritmetický/geometrický průměr, modus, medián...

Alternative:

We divide the students into three groups, so that each group processes one question. If we have a computer room, we can set more questions and divide the students into more groups. The students then familiarize one another with the results of a statistical file.

Who lives in the city

Recommended grade: 9.

Object of activity: Solution of a riddle

Target language: See text; simple present and continuous tense

Aids: Worksheet with data, envelopes with sentences and words

Time allowed: 15–20 minutes

- The students form groups of four.
- It would be a good thing, if we prepared in advance seven envelopes for each group. One envelope contains names, the second TV programmes, the third names of the countries they are flying to, since they are waiting at the airport, the fourth the ages of individuals, the fifth hairstyles and the sixth the locations where they live. The seventh envelope contains cut up sentences.
- Based on information about the individuals, the students must determine which one watches a particular television programme, which country they fly to, how old they are, what style of hair they have, and where they live. They draw up a table (see solution).
- Either we place a time limit on the task, or we wait until the first student has solved the riddle.
- The students put the data acquired into sentences, e.g.: *“Bob watches / likes watching The Simpsons. He is 46. He lives in a town. He is bald and is flying to France.”*

Correct answers:

Name	1 Bob	2 Rachael	3 Keeley	4 Amy	5 Eilish
Favourite TV programme	The Simpsons	Coronation Street	Desperate Housewives	Eastenders	Neighbours
Destination	France	Italy	Africa	England	Australia
Age	46	21	52	81	14
Where they live	Town	Youth Hostel	Village	Farm	City
Hairstyle	Bald	Long	Afro	Curly	Straight

Build a beetle

Recommended grade: 9.

Object of activity: Construction of the body of a beetle by solving mathematical problems.

Target language: Questions, parts of a beetle's body

Cross-curricular relationships: Biology

Aids: Sheet of paper, pencil, cards with assignments, small bag, picture of a beetle, parts of a beetle's body with descriptions

Time allowed: 20 minutes

- The students divide into teams and we cut up the questions into individual cards. Either we throw them into the bag, or we spread them out over the table, back facing up. It would be a good idea to place the parts of the beetle's body with descriptions alongside a picture of a complete beetle in a visible location to serve as an aid.
- All the teams are given the same task, e.g. *"Add the numbers two hundred and fifty five (255) and thirty three (33)."* The answer is: *"Two hundred and eighty eight (288)."*
- The team answering first correctly selects a part of the beetle's body it wishes to compete for and draws a card with an task.
- We read the question out loud. It is intended for all teams and if the students choose to compete for the beetle's head, we say: *"For the head, answer this question: One night in a hotel room costs £ 35. How much would it cost to stay for 4 nights?"*
- One member of each team writes the answer on paper and raises it above his/her head. All teams which correctly answer £ 140, draw the beetle's head on their paper. They have 20 seconds to arrive at the answer. If they answer wrongly or not at all, they will not draw.
- The next team (they take turns) selects the next part of the body and the question. Again, all teams answer at once.
- If it should happen that one of the teams has already has the given part of the beetle, it does not need to answer the question. If we find out that somebody is cheating, his/her team loses the part of the beetle in question. We can make a rule that it will not be possible to draw the antennae before the head, or the legs before the thorax. If two or more teams need to acquire the same body part to win, the team answering most rapidly and correctly, wins.

Classroom language:

<i>antenna</i>	tykadlo
<i>wing</i>	křídlo
<i>thorax</i>	hrudník
<i>abdomen</i>	břicho, zadeček (u hmyzu)
<i>leg</i>	noha

Correct answers:

There are 50 apples in a box. Four-fifths have gone bad. How many are all right? <i>10 apples</i>	Look at these numbers: 5.81; 5.805 and 5.91001. Write down the smallest number. <i>5.805</i>
Solve the problem 9 times 7. <i>63</i>	Solve the problem 174 minus 80. <i>94</i>

Add 234 and 11 and then multiply by 2. What is the answer? <i>490</i>	The numbers 1, 4, 9, 16, 25 and 36 are square numbers (dvojmocniny). What is the next square number? <i>49</i>
Write the number two million four hundred thousand and two. <i>2,400,002</i>	How many cm are there in 3.2 m? <i>320 cm</i>
A cube has a volume of 27 cm^3 . What is the length of 1 side? <i>3cm</i>	What is three fifths as a decimal? <i>0.6 or 0.60</i>
What is $0.23 + 0.79$? <i>1.02</i>	Solve the equation: $\frac{x}{7} = 3$ <i>x = 21</i>
Find the area of a triangle with a height of 9 m and a base of 12 m. <i>54 m^2</i>	What is the square root of 169? <i>13</i>

Alternative:

We can use a different illustration in place of the beetle, e.g. a different animal, a human body, a plant, or a face. If we choose a human body or face (known/unknown person), we can cut it out from a magazine, or print it as a photograph from Internet. We prepare a picture for each group and the students build it in the same manner as for the beetle.

Store manager – fractions

Recommended grade: 7.

Object of activity: Calculation with percentages

Target language: *Discount, tax, percentage, even numbers, odd numbers*

Aids: Worksheet, playing dice for each pair

Time allowed: 15 minutes

- The students sit in pairs.
- Everyone receives a worksheet and a single dice is given to each pair.
- Each student rolls the dice twice; the first roll determineing if there is a discount (this will apply to even numbers 2, 4, 6 ...) or a tax (this will apply to odd numbers 1, 3, 5 ...). The second roll determines the percentage, 1 for 10%, 2 for 20%, 3 for 30%, 4 for 40%, 5 for 50%, and 6 for 60%.
- The students take turns to roll the dice and then calculate the price of individual items of goods and the total price.
- Pairs of students check one snother's results.
- The students from a pair with the lowest prices are declared "*Customer-friendly Store Managers*".

Classroom language:

Each player rolls the dice twice.

The first throw means a discount or a tax.

You get a discount when you throw an even number.

You pay tax when you throw an odd number.

The second throw means how much as a percentage.

Calculate the price of the goods and the total.

Those with the lowest final price are the winners.

Každý hodíte kostkou dvakrát.

První hod znamená slevu, nebo daň.

Sleva je, když vám padne sudé číslo.

Daň je, když vám padne liché číslo.

Druhý hod znamená procenta.

Vypočítejte cenu zboží a celkovou cenu.

Ti, kteří mají nejnižší cenu, jsou *the* vítězové.

Fractions -- Smarties

(English brand name of *lentilky*)

Recommended grade: 6.

Object of activity: Practice of fractions using coloured Smarties

Target language: *Colours, fraction (zlomek), denominator (jmenovatel), numbers; I have*

Aids: Box of Smarties, table and worksheet

Time allowed: 20–25 minutes

- We ask the students to bring a box of Smarties to the mathematics class.
- We distribute the worksheet with table.
- The students pour out the contents of the box and count the number of Smarties: *"Count the Smarties in your box. How many Smarties have you got in total?"* They write the number into the worksheet (we show where): *"Write down the number here."*
- We can mention that the given number, the total number of Smarties, is called the denominator and lies below the fraction line: *"This number is called the denominator and goes at the bottom of every fraction."*
- The students then divide the Smarties according to colour: *"Divide the smarties according to their colour."*
- When the Smarties have been divided, the students take the table and fill in the data. They write the colour of the Smarties in the first column, the number of Smarties of a given colour in the box in the second column, the number from the total amount of Smarties in a box (in fractions) in the third, and the equivalent of the given fraction (if it exists) in the last column. We can fill in the first row alongside the students for better demonstration.
- We walk among the students while they are working and check that they are doing it correctly; helping if necessary.
- The students may ask one another about the number of Smarties in individual colours and the fractions.
- We collect the worksheet with the table from the students and check to make sure their fractions are correct, or that they were properly converted. We then return the worksheets to them.
- Lastly, the students can eat the Smarties.

Classroom language:

Count the smarties in your box.

How many smarties have you got in total?

Write down the number here.

This number is called the denominator and goes at the bottom of every fraction.

Divide the smarties according to their colour.

What colour is this smartie?

How many (red) smarties have you got?

What fraction of your smarties is (red)? Jaký zlomek tvoří (červené) lentilky?

Fill in the table, please.

Could any of the fractions be made simpler?

For instance, are any of them the same as $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{3}$?

Spočítejte lentilky ve své krabičce.

Kolik jich máte celkem?

Napište počet zde.

Toto číslo se nazývá jmenovatel a je pod zlomkovou čarou.

Rozdělte lentilky podle barev.

Jakou barvu má tato lentilka?

Kolik (červených) lentilek máš?

Jaký zlomek tvoří (červené) lentilky?

Vyplňte tabulku, prosím.

Lze některé z těchto zlomků zjednodušit?

Odpovídají například některé z nich $\frac{1}{2}$, $\frac{1}{4}$ nebo $\frac{1}{3}$?

Alternative:

The students can work in pairs, or in groups.

Supplementary activity 1:

The students can illustrate graphically the number of Smarties of individual colours. They draw such a number of sets as there are colours in the box; they write in the name of the colour of the Smarties beside each set using a corresponding crayon. The students shall place the same number of dots in the set as they find Smarties of the given colour (e.g. four red Smarties are recorded by the set labelled by the red crayon and containing four dots). In the end they can include the number from the total amount for each set.

Supplementary activity 2:

Conversion of the fractions to decimal places, or percentages, if possible.

Mathematical riddle

Recommended grade: 6.–9.

Object of activity: Solution of a riddle

Target language: See worksheet

Aids: Worksheet with text, cut-out frogs and lily pads (or collected pebbles and buttons, if necessary)

Time allowed: 10–15 minutes

- We divide the students into pairs or groups of three. Each group receives a worksheet with text.
- We give the students some time to review the text and we ensure that they understand all words and sentences properly (it is very important for solving the scenario).
- They must then find the correct solution in groups i.e. how both the frog families get to the other side of the pond under the given conditions and what minimum number of leaps they must make to get to the other side.
- The cutout lily pads may aid the students (they are marked by the number 1-7 for easier view ability) as well as the frogs (marked using the letters A-F), which they can move at their discretion, thereby finding the correct solution. Instead of paper frogs we can use pebbles or buttons and we can draw the lily pads on a piece of paper, re-marking everything.
- The first group to find the correct answer wins and receives a reward.

Note: We do not wait too long to find the solution, we set a time limit. If we see that the students are having difficulty finding the solution, we can solve the riddle together as a class.

Correct answer:

The frogs must make a total of 15 leaps to get to the other side of the pond.

Supplementary activity:

The students try to solve the same problem using different numbers of frogs and lily pads on the pond. They fill in the table and try to find the equation which can be used to determine the number of leaps to get the frogs to the other side of the pond, given the number of frogs.

1. *Now try...*

- *4 frogs in each family with 9 lily pads*
- *5 frogs in each family with 11 lily pads*
- *6 frogs in each family with 13 lily pads*

2. *Complete the table:*

Frogs in family (f)	3	4	5	6	7
Leaps (l)					

3. *Can you see a pattern?*

4. *Use your pattern to work out how many leaps would be needed for 8 frogs in each family on 17 lily pads.*

5. *Write a general statement which explains how to work out the number of leaps (l) if you know the number of frogs (f).*

6. *Use your statement to work out the number of leaps for...*

- *a family of 11 frogs*
- *a family of 15 frogs*
- *a family of 50 frogs*
- *200 frogs altogether*

Fractions -- loops

Recommended grade: 7.

Object of activity: Formation of a loop from the cards, based on a correct formulation of questions and answers

Target language: *Fraction, whole number, numerator, denominator, equivalent fraction, decimal*

Aids: Cards with questions and answers, multicoloured paper, envelope or plastic bag

Time allowed: 15 minutes

- We copy a set of cards and cut them up for each group of students (we can use paper of various colours, so that we can separate the cards easily if they get mixed up). Each player receives four to five cards and we also adjust the number of players in the group to meet these criteria. We also adjust the number of students in the group according to their ability.
- We copy the sheet of correct solutions for each group.
- We insert the deck of cards with correct solutions into an envelope or a plastic bag.

Note: We can keep the solution next to us and give it to the students at the end of the game.

- One of the students mixes the cards and deals them to the other players, including him/herself.
- The person to the right of the dealer begins the game. He/she reads the text in the bottom half of the card and places the card in the centre of the table. This is the first card of the "loop."
- Each member of the group looks at his/her cards and determines if he/she has the correct answer. The player who thinks that he/she has the next card, informs the others and reads the text aloud: *"I think I've got the correct answer."*
- All listen carefully and determine if it is correct, or consider other possible answers. Students in a group focus on the same question and work together.
- When they have all agreed on the answer, they place the given card under the first as in dominoes. If they are uncertain about the answer, they can mark the card with coloured paper or mark it lightly in pencil, so that they can return to it if they need to complete the loop.
- The player who places the second card reads the question/first part of the sentence located on the placed card.
- This process is repeated, until the loop is complete; the last card contains the answer to the question on the first card but if it does not, the players must go through all of the cards and find the mistake. Lastly, we hand out sheets to them to check the solutions.

Classroom language:

Remove the cards from the plastic bag/envelope.

Shuffle the cards.

Deal the cards out in a circle until all of the cards gone.

Vyndejte karty z plastového sáčku/obálky.

Karty promíchejte.

Rozdávejte karty v kruhu, ať dokud nebudou všechny karty rozdané.

The person to the right of the dealer starts the game by placing a card on the table and reading the question.

Everyone should look to see if they hold the correct answer on any of their cards.

Say: "I think I've got the right answer" if you think your answer matches the question.

Read the possible answer aloud.

Discuss with the group if it's the best answer.

Place the answer below the question in domino-like fashion.

Read the question on the card that you just placed on the table and repeat.

Osoba napravo od rozdávajícího zahájí hru přečtením otázky z jakékoli ze svých karet.

Každý se podívá, zda má kartu se správnou odpovědí.

Řekni: „Myslím, že mám správnou odpověď“, pokud si myslíš, že tvoje odpověď patří k otázce.

Přečti možnou správnou odpověď nahlas.

Rozhodněte, zda je přečtená odpověď nejlepší odpovědí.

Umístěte odpověď pod otázku a jako v dominu.

Přečtěte otázku z karty, kterou *placed* jste položili na stůl.

Alternative:

The entire class joins in the game. If we have a small class, we copy and magnify the cards. Each student has a maximum of one or two cards, which they successively lay on the floor until a loop is formed, where the last question once again connects to the answer on the first card.

Graph

Recommended grade: 7.

Object of activity: Preparation of graph based on data from a questionnaire

Target language: *Survey, questionnaire, pie graph, column graph, results; musical instruments; question in the simple present tense and short response*

Cross-curricular relationships: Music lessons

Aids: Worksheet

Time allowed: 10 minutes

- We ask several students if they play a musical instrument: *“Do you play a musical instrument?”*
- The students answer truthfully: *“Yes, I do. I play the (guitar) / No, I don’t.”*
- We ask the students to conduct a survey among their classmates to find out who plays/does not play a musical instrument and if he/she plays, which instrument: *“Let us conduct a survey. Ask your friends if they play a musical instrument, and if she/he does which musical instrument it is.”*
- We hand out worksheets to the students in which they shall record the results of the survey.
- The students ask one another: *“Do you play a musical instrument?” Which instrument do you play?”*
- They record the results in the table and mark them in the bar graph and pie chart: *“Place your results in the bar graph and pie charts.”* To demonstrate we show graphs we made, based on the answers of our colleague or of students from a different class (does not have to relate only to musical instruments).

Classroom language:

“Do you play a musical instrument?”

Which instrument do you play?

Let’s take a survey.

Ask your friends if they play a musical instrument, and if she/he does which musical instrument it is.

Place your results in bar graphs and pie charts.

Hraješ na hudební nástroj?

Na jaký nástroj hraješ?

Proveďme průzkum.

Zeptejte se spolužáků, zda hrají na hudební nástroj a pokud ano, který hudební nástroj to je.

Výsledky umístěte do sloupcového a kruhového grafu.

Fractional part

Recommended grade: 7.

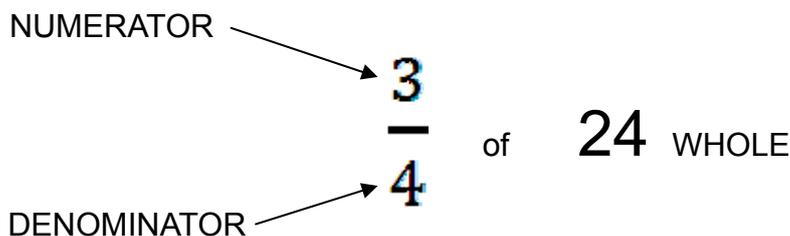
Object of activity: Calculation of the fractional part of a whole

Target language: *Fractions, fractional part, whole, divide, multiple, bottom number (denominator), top number (numerator), equals*

Aids: Chalkboard, chalk, or small poster and cards with examples, soft ball

Time allowed: 20 minutes

- We write an arbitrary fractional part from the whole on the blackboard and describe its individual numerals. We can prepare a small poster in advance as an aid and use it repeatedly.



- We jointly repeat how the calculation of the fractional part of a whole. We can use an example on the blackboard.
- We ask the class if anyone knows how to read the given problem in English. If not, we try to do it jointly: *“Three quarters of twenty four”* (we read the nominator as a numeral in the plural, if the numerator is greater than one). We follow with the question: *“How much is three quarters of twenty four?”* The students may answer, because they know the answer already from the previous calculation in the mother tongue.
- We now describe the procedure for the calculation slowly and in English, so that it can be understood: *“Divide twenty four by the denominator, which is four. (24 ÷ 4 = 6) Twenty four divided by four is six. Multiple six by the numerator, which is three. Six multiplied by three is eighteen (6 × 3 = 18). So, three quarters of twenty four equals eighteen.”*
- We write a 3 x 3 table on the blackboard and we fill it in using the cards with mathematical examples. We place the cards on the blackboard face down. The columns in the table are marked with the letters A-C, rows 1-3.
- The students form teams.
- The teams take turns to throw balls at the cards; the card they hit is turned over. The given team must solve the problem on the card. The team representative reads the problem and then answers by a complete sentence: *“Three quarters of twenty four is/equals eighteen.”*
- If they calculate the problem correctly, they are given the card and mark it with their symbol; if not, their competitor is given the opportunity.
- The team which solves the highest number of problems, wins.

Problems:

$\frac{1}{5}$ of 60

$\frac{2}{5}$ of 60

$\frac{1}{8}$ of 104

$\frac{3}{8}$ of 104

$\frac{7}{10}$ of 260

$\frac{4}{5}$ of 500

$\frac{5}{6}$ of 90

$\frac{1}{10}$ of 900

$\frac{2}{3}$ of 33

Results: 12, 24, 13, 39, 182, 400, 45, 90, 22

Classroom language:

How much is three quarters of twenty four?

Kolik jsou tři čtvrtiny z dvaceti čtyř?

Divide twenty four by the denominator, which is four.

Vydělte dvacet čtyři jmenovatelem, což jsou čtyři.

Twenty four divided by four is six.

Dvacet čtyři děleno čtyřmi je šest.

Multiple six by the numerator, which is three.

Vynásobte šest činitelem, což jsou tři.

Six multiplied by three is eighteen.

Šest krát tři/násobeno třemi je osmnáct.

So, three quarters of twenty four is/equals eighteen.

A tak tři čtvrtiny z dvaceti čtyř se rovnají osmnácti.

Triangle – median and centroid

Recommended grade: 6.

Object of activity: Comprehension of instructions in a foreign language, finding the median and the centroid of a triangle

Target language: *Triangle, median, centroid, line, vertex, intersect*

Aids: Sheet of paper quarters, scissors, drawing materials, thread, notebooks, blackboard, sample triangle cut out of paper quarters

Time allowed: 10 minutes

- We ask the students in English to draw triangle KLM: $k = 4.5\text{ cm}$, $l = 6\text{ cm}$, $m = 7.5\text{ cm}$. We draw the triangle on the blackboard and the students draw it in their notebooks: *“Draw a triangle KLM where side k measures 4.5 cm, l = 6 cm, m = 7.5 cm.”*
- All students mark the centre point of line KL: *“Now mark the midpoint of the line KL.”*
- We draw a line connecting the apex of triangle M with the centre point of line KL: *“Now draw a line that passes through both a vertex and the centre point of the line KL.”* The resulting line is called the median (centroidal axis).
- We ask the students to define the median in their mother tongue.
- The students then construct the remaining medians of the triangle: *“Draw the other medians of this triangle, please.”* The instructor draws them on the blackboard.
- When the students have finished drawing, we indicate the point where the medians intersect and ask the students what the point is called and where it comes from. *“What is this point? Where does it come from?”* The students answer in their mother tongue: *„To je bod, ve kterém se protínají tři těžnice. Jedná se o těžiště.“* We can respond in the following way: *“Yes, very good. That is the point where the three medians intersect, and it is called the centroid.”*

Interest:

We can verify the median by using compasses or a string. We can show students a large triangle made from paper quarter sheets with the median marked. We show that if we support the triangle at its median, e.g. using the tip of compasses or a pin, the triangle assumes a balanced, horizontal position. We explain that the triangle may be hung, e.g. on a string passing through the median and the triangle will once again balance.

Fractions in recipes

Recommended grade: 7.

Object of activity: Modification of the number of ingredients in recipes using fractions

Target language: See worksheet

Aids: Worksheet with recipe

Time allowed: 10 minutes

- Each student receives a card with a simple recipe. The amounts of ingredients are enough for eight people.
- The students' task is to modify the amounts of ingredients to be enough for a smaller number of people, first for $\frac{3}{4}$ of eight persons, then for $\frac{1}{2}$ of eight persons and finally for $\frac{1}{4}$ of eight persons. The problem is also given on the worksheet in English.
- The students work individually and the first student to solve the problems is rewarded.

A calculator is fun

Recommended grade: 6.–7.

Object of activity: Learning to use a calculator, using the calculator for fun calculations

Target language: *Calculator, numbers*

Aids: Calculator, problems

Time allowed: 10 minutes

- We write the following problems on the blackboard:

$$230 \times 230,5 + 30 =$$

$$3\ 867 \times 2 =$$

$$14 \times 6 + 626 -$$

$$5\ 508 \times 2 \times 5 \div 10 =$$

$$32 \times 100 + 15 =$$

- We divide the students into groups.
- The students' task is the solution of the problems on the blackboard as quickly as possible, to turn the calculator upside down as soon as the result is displayed and to write down the word they see: *"Use your calculator to work out the calculations. Turn it upside down. Can you read it as a word?"*
- The group which correctly calculates the problems and records the resulting word first, wins.
- We jointly check the answers. The students read the numbers and words in English. They can spell out the English word.

Correct answers:

53 045	SHOES
7 734	HELL
710	OIL
5 508	BOSS
3 215	SIZE

Supplementary activity:

The students invent a short story using the words, the only condition being that all the words must be used in the story.

Multiples of natural numbers

Recommended grade: 6.

Object of activity: Practice of the multiples of natural numbers up to 100

Target language: *Multiples, numbers 1 to 100*

Aids: None

Time allowed: 5 minutes

- We familiarize the students with the rules of the Ding Bang game. We choose two multiples, e.g. three and eight. The multiples of three are represented by the word Ding and multiples of eight by the word Bang.
- The students repeat the numerical order in English until they arrive at the given multiple, e.g.: *"One, two, ding, four, five, ding, seven, bang, ding, ten, eleven, ding, thirteen, fourteen, ding, bang, seventeen, ding, nineteen, twenty, ding, twenty-two, twenty-three, ding bang,*
- *twenty-five – five, twenty-six, ding, ..."*
- The person who makes a mistake is eliminated.

Measuring length

Recommended grade: 6.

Object of activity: Conversion of units of length, learning how to use them

Target language: *Millimetre, centimetre, decimetre, metre, kilometre*; grading adjectives into *short* and *long*

Cross-curricular relationships: Physics

Aids: Pieces of paper with various lengths written on them (see attachment), blackboard

Time allowed: 10 to 15 minutes

- We familiarize the students with the object of the lesson, namely, repetition of conversion of individual units of length, using teamwork. We ask in English that selected students should answer the questions and write their answers on the blackboard, e.g.: *“How many metres in six decimetres?”*
- We divide the students into groups.
- Each student in the group receives a piece of paper with a written length. Each group has the same set of cards. The group’s task is to arrange them from the shortest to the longest (they may only communicate in English).
- The group which arranges them correctly first, wins.
- We jointly read and compare the values at the end of the class, e.g.: *“1.6 dm is longer than 0.16 mm”* or *“0.16 mm is shorter than 1.6 dm.”*

Classroom language:

How many metres are 6 decimetres?

Zero point six metres (0.6m).

How many metres in 45 centimetres?

Zero point forty five metres (0.45m).

How many centimetres in 8 millimetres?

Zero point eight centimetres (0.8cm)

How many metres are 2 kilometres?

Two thousand metres (2000m).

How many decimetres are 38 centimetres?

Three point eight decimetres (3.8dm).

Kolik metrů je 6 dm?

Žádná celá šest (desetin) metru.

Kolik metrů je 45 cm?

Žádná celá čtyřicet pět (setin) metru (0,45 m).

Kolik centimetrů je 8 mm?

Žádná celá osm (desetin) centimetru (0,8 cm).

Kolik metrů jsou 2 km?

Dva tisíce metrů (2 000 m).

Kolik decimetrů je 38 cm?

Tři celé osm (desetin) decimetru (3,8 dm).

Supplementary activity:

The students individually compare the units of length. using in written form, the symbols $<$, $>$, $=$, and in spoken form the 2nd degree and in 3. the 3rd degree and if applicable, the adjectives of the words *long* and *short*, e.g.:

0.16mm < 1.6dm

/ 0.16mm is shorter than 1.6dm/

0.3dm > 3mm

/0.3dm is longer than 3mm/

28cm > 2.8mm

/28cm is longer than 2.8mm/

160m < 1.6km

/160m is shorter than 1.6km/

13m = 1300cm

/the same/13m equals 1300cm/

The value of an expression at a given point

Recommended grade: 8.–9.

Object of activity: Practice of the calculation of the values of an expression for a given point

Target language: *Term, value of a term, variable, install a variable, domain of a term*

Aids: Cards with expressions, cards with values (see worksheet)

Time allowed: 15 minutes

- We stick the cards with expressions on the classroom wall, or spread them out over the floor (we choose the degree of difficulty of the expressions on the basis of the material covered).
- We distribute cards with the problems to the students, e.g. $f(3) = -2$.
- The students scatter around the classroom and look for the expression to which the problem $f(3) = -2$ applies.
- The students stay by the expression they have found.
- Lastly, we jointly check the solution and the students read both the problem and the expressions.

Classroom language:

The functional value in point 3 equals 2.

The value in point 3 is 2.

Funkční hodnota v bodě 3 se rovná 2.

Hodnota v bodě 3 je 2.

Supplementary activity 1:

The students can calculate how many of them ended at the same expression. They may also express it as a fraction and a percentage of the total number of students in the classroom.

Supplementary activity 2:

The students can determine the domain defined by the expression, or modify the expression, as required.

Spatial imagination

Recommended grade: 8.–9.

Object of activity: Training of the students' spatial imagination

Target language: *Cube, cube grid, image of a cube*

Aids: Worksheet, model of a cube, scissors, blackboard

Time allowed: 15 minutes

- The students receive a worksheet containing a cube network. Each identical cube contains a picture.
- The students draw letters in the correct position in the free horizontal projection on the side of the cube.
- To make the task easier, the students may cut out the cube network and construct it.

Classroom language:

Complete the sides of the cubes

with the letters in the correct position.

Doplňte stěny krychle písmeny ve správné poloze.

Alternative:

We enlarge the cube network several times and place it on the blackboard. The students arrange themselves into teams. Each team receives the same number of identical cubes, i.e. with pictures located on the same side of the cube and in the same position (we copy them from the worksheet and cut them into cards). The problem remains the same. The team which fills in the letters correctly and most rapidly, wins. We check the result by constructing the cube network located on the blackboard.

Supplementary activity:

The students construct English words from the letters.

Square roots -- square

Recommended grade: 8.

Object of activity: Practice of partial square root calculations

Target language: *Square, root of (a number), equal*

Aids: Jigsaw puzzle (see worksheet)

Time allowed: 15-30 minutes (depending on the level of the class)

- Pairs of students receive nine cards in the form of a square which they must build into larger square of a size corresponding to 3 x 3 cards.
- The squares should touch with their adjacent sides, so that their individual sides shall contain equal expressions, e.g. the first square on the one side with $\sqrt{50}$ is equal/equivalent to the side of square $5\sqrt{2}$.
- The pair which correctly assembles the squares first, wins.

Classroom language:

Make a square out of the cards so that the neighbouring squares touch each other with equivalent terms.

Vytvořte z kartiček čtverec tak, aby se jejich jednotlivé strany dotýkaly, a to stranami s ekvivalentními výrazy.

Alternative 1:

The same may be done for a square with a size of 4 x 4 cards.

Alternative 2:

This brain-teaser may be used for a randomly chosen topic (fractions, percentage, expressions,...).

Square roots – estimating the size

Recommended grade: 8.

Object of activity: Creation of a concept of the size of square root numbers

Target language: *Square root of..., to order, bigger than..., smaller than...,/natural numbers*

Aids: Cards with natural numbers, cards with square roots

Time allowed: 15 minutes

- The students draw cards with natural numbers and cards with square roots (they can be differentiated by the use of colours). Each student receives one card.
- First, the students with natural numbers are arranged in ascending order: *“If you have got a natural number, line up from the smallest number to the highest one.”* They hold the cards with the numbers in such a way that everyone can see them.
- The students who have the square roots must line up correctly between the natural numbers: *“If you have a square root, stand between the right natural numbers.”*
- Each student reads his/her number/square root and find the second square root of the number on the cards.
- The students who found the second square root of the numbers, tell it to their classmates who have a card with a natural number.

Classroom language:

If you have got a natural number, line up from the smallest number to the highest one.

If you have got a square root, stand between the right natural numbers.

The square root of 27 (twenty seven) is 5.196 (five point one nine six).

Pokud máte přirozené číslo, seřadte se od nejmenšího čísla po nejvyšší.

Pokud máte druhou odmocninu, stoupněte si mezi dvě správná přirozená čísla.

Druhá odmocnina z 27 (dvaceti sedmi) je 5,196 (pět celých sto devadesát Šest tisícín).

Alternative:

We give each student a card with a square root. We fasten numbers without square roots on the classroom wall. They again place themselves according to size between the numbers located on the walls. They hold their square root in front of them, so that their classmates can see them.

Supplementary activity:

The students compare natural numbers, square roots.

Circumference of a circle, the number π

Recommended grade: 8.

Object of activity:

Target language: *Circle (kruh i kružnice), diameter, radius, length, circumference to compare, two times bigger than..., to round, rounded off result, multiply*

Aids: Paper quarters, compass, scissors, string

Time allowed: 10–15 minutes

- We write in the column on the blackboard the mathematical terms under one another and illustrations into the opposite column. The students match the corresponding illustrations and the terms, familiarizing themselves with the terms we will work with.
- The students construct circles on the paper quarter with different radii (2cm, 3cm, 4cm,...).
- They cut out the drawn circles.

Note: To speed up the task, we can cut out the circles before the lesson begins. All the students have either identical circles, or each student has a different one (depending on the instructor's decision). If they all have the same circles, they can vary them for easier viewing by the use of different colours, e.g. colour of the smallest circle being blue, the next larger one red, etc.

- The students prepare a string. They place it around the circumference of individual circles and cut them where the beginning and the end of the string meet.
- The students have a string equal in length to the circumference of every circle.
- The students measure their strings (accurately to half a millimetre) and record it in their exercise books, e.g. $r_1 = 2 \text{ cm}; d_1 = 2 \cdot r_1 = 4 \text{ cm}; o_1 = 12,55 \text{ cm}$.
- The students then report the results of their measurements, e.g.: *"The radius of circle one is two centimetres. The diameter is four centimetres and the perimeter is twelve point fifty five centimetres."*
- The students calculate the number x as instructed by the teacher $x_1 = o_1 : d_1$ and write the result in their exercise books (they divide each circumference by the diameter of the circle): *"Divide each circumference by the diameter of the circle."*
- They compare their resulting numbers in individual circles with those of their classmates.
- If the numbers are identical (or "nearly" identical), they mark this number as significant and name it π . If they were already introduced to the number π , they should realize that it is the same number.
- We give the equation for the circumference of a circle and discuss the number π .

Classroom language:

The radius of circle one is two centimetres.

*The diameter is four centimetres
and the circumference is twelve point
fifty five centimetres.*

Divide each perimeter by the diameter of a circle.

Poloměr prvního kruhu jsou
2 cm.

Průměr jsou 4 cm
a obvod je 12,55 cm.

Vydělte každý obvod průměrem
kruhu.

Alternative:

Instead of the cutout circles, we measure the diameters of bottle caps of various sizes as accurately as possible.

Supplementary activity 1:

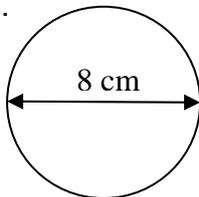
The students compare the circumferences of circles. They write in their notebooks or on a blank sheet of paper e.g. *The circumference of the blue circle is bigger than the circumference of the red circle by 1 cm.*

Conclusion: The ratio of the radii of two circles is equal to the ratio of the circumferences of these circles.

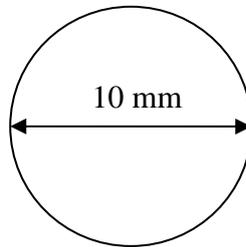
Supplementary activity 2:

Find the circumference of the following circles:

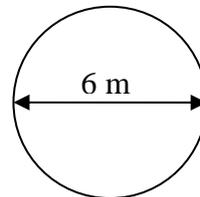
1.



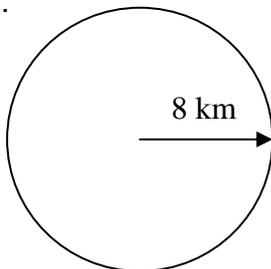
2.



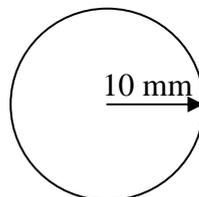
3.



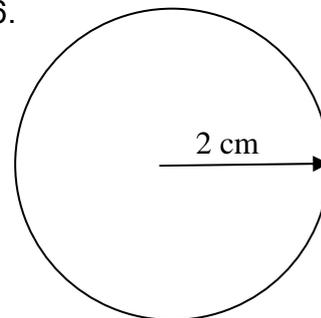
4.



5.



6.



7. A bicycle wheel of diameter 80 cm makes 20 complete revolutions as the bicycle moves forward in a straight line. Find the circumference of the wheel and work out how far the bicycle moves forward. Give your answer in metres.

8. The wheels on Gill's bicycle have a diameter of 62 cm. Gill moves forward a distance of 1 200 cm. Calculate how many times the wheel goes around completely.

Similarity of triangles

Recommended grade: 8.

Object of activity: Determination of similar triangles using the “angle-angle-angle” rule on similarity

Target language: *Triangle, angle, similar, identical*

Aids: Paper triangles (see worksheet)

Time allowed: 15 minutes

- Each student receives a coloured triangle. The triangles are yellow, blue, and red.
- The student finds a classmate whose triangles are similar to his/hers.
- The students compare the triangles and place them next to one another.
- Lastly, the students arrange themselves into groups of three (blue, yellow, and red).

Classroom language:

Find partners whose triangle is similar to yours.

Compare the triangles.

Najdi partnery, jejichž trojúhelníky jsou podobné tvému.

Porovnej trojúhelníky.

Supplementary activity 1:

We ask the students to say why the triangles are similar. The students try to formulate the “angle-angle-angle” rule of similarity. *The triangles are similar because all of their internal angles are equal.* It suffices to say: *“This angle in the blue triangle is equal to this angle in the red triangle.”* Or:

Supplementary activity 2:

The students compare the sizes of their triangles and arrange themselves in matching order. They try to estimate the coefficient of similarity by comparing the sides (how much smaller or bigger is a triangle). If there is time, they can verify their guess by measuring the sides.

Grid and surface of a cylinder

Recommended grade: 8.

Object of activity: Determination of the grid of cylinder and of the equation for determining the surface of the cylinder

Target language: *Cylinder, base, lateral surface, radius, height, circumference, rectangle area*

Aids: Small cylindrical-shaped boxes (e.g. from wafers, candy, chips), scissors

Time allowed: 15 minutes

- Students write down the following task: *“Construct a grid of a cylinder and calculate its circumference. Cylinder: r – radius of the base; h – height of the body.”*
- The students work singly, or in pairs. They measure the radius of the base and the height of their figure and record these values in their notebooks.
- They cut out the base or remove it in some other way. Only the lateral surface remains.
- The students cut up the lateral surface (perpendicularly to the base), usually along the “fold” of their box and unfold the lateral surface.
- The students try to describe the procedure and the values acquired in English.
- Conclusion: *“The unfolded lateral surface of a cylinder is a rectangle with sides $2\pi r$ (or πd) and h .”*

Classroom language:

Construct a grid of a cylinder and calculate its circumference.

*Cylinder: r – radius of the base;
 h – height of the body.*

First, I measured the radius of the base which is...

Second, I measured the height of the cylinder which is...

Third, I removed the base and I got the lateral surface.

Finally, I cut the lateral surface and unfolded it.

Sestroj síť válce

a vypočítej jeho povrch.

Cylinder: r – radius of the base;
 h – výška tělesa.

Zprv jsem změřil/a poloměr podstavy, což je...

Zadruhé jsem změřil/a výšku válce, což je...

Zatřetí jsem odstranil/a podstavu a získal/a jsem plášť.

Nakonec jsem rozstříhl/a plášť a rozvinul/a ho.

Supplementary activity:

The students construct a grid of the figure and calculate the surface of the cylinder.

Modifying fractional expressions

Recommended grade: 9.

Object of activity: Practice of modifying fractional expressions and equations
 $(a + b)^2$; $(a - b)^2$; $a^2 - b^2$

Target language: (un)modified term in brackets, domain of definition of a term, x must not equal..., variable (quantity)

Aids: Cards with expressions (see worksheet)

Time allowed: 10 minutes

- Divide the students into groups.
- Each group receives a set of cards with unmodified fractional expressions.
- We spread the cards with modified expressions round the classroom.
- The students look for the modified equivalent of their expression.
- The group which creates the correct pair first, wins.
- Lastly, we jointly read the expressions.

Classroom language:

*open brackets x minus 2 close brackets, multiplied by,
open brackets x plus 2 close brackets / open brackets
 x minus 2 close brackets, times, open brackets x plus 2 close brackets
two minus x all squared
two minus x squared
 x squared minus 4
 x squared minus two x plus one, over, two x plus 2 /
 x squared minus two x plus one, divided by, two x plus 2*

Alternative:

Half the students have modified expressions, the other half have unmodified expressions. They look for each other in the classroom and they form pairs. They jointly decide on conditions.

Supplementary activity:

The students define the modification which modifies the expression. For example: “I modified the expression $x^2 - 4$ according to the difference of squares $(x - 2) \cdot (x + 2)$, and then I simplified the expression.” The students determine the definition set (conditions) of the expression. For example: $x \neq 2$ and also $x \neq -2$.

Cube grid

Recommended grade: 9.

Object of activity: Training the students' spatial imagination

Target language: *Grid, cube, cube grid, draw*

Aids: Worksheet (square grid), scissors

Time allowed: 10 minutes

- Students divide into groups.
- Each group receives a worksheet with square grid.
- The students cut out as many different cube grids as possible; the length of the side of the cube should equal a square grid unit on the worksheet.
- The students assemble a cube from the cutout grids.
- The group is awarded a point for every correctly assembled cube. The student with the highest number of points, wins.

Classroom language:

Cut out as many cube grids as possible.

Vystřihněte ze sítě tolik krychlí, kolik je jen možné.

Construct/Make cubes out of the grids.

Sestavte/udělejte ze sítí krychle.

Supplementary activity:

The students discuss several less frequent grids and try to convince their classmates that it is possible to make a cube from them. The students draw or sketch several grids, or all which appeared, in their notebooks.

Recommended grade: 9.

Object of activity: Consolidation of the concept of shape grids, practice of spatial imagination

Target language: *Grid of a shape, prism, block, cube, cone, pyramid, cylinder*

Aids: Worksheets with prepared grids, scissors

Time allowed: 15 minutes

- The students must discern what is and what is not a grid of shape. They work in small groups.
- The students cut out grids of the shapes (even assumed grids) and assemble the shape (if possible).
- If the shape cannot be formed, they place it aside and try to explain why it cannot be done.
- The group which find the highest number of shapes and names them correctly in English, wins.

Classroom language:

Cut out the grids of the shapes.

Construct the shapes.

If you can't put a shape together, put it away.

Explain why it is not possible to put it together.

Vystřihněte sítě těles.

Sestavte tělesa.

Pokud vám nejde těleso složit, dejte ho stranou.

Vysvětlete, proč není možné těleso složit.

Supplementary activity:

The students glue on, or trace the grids found into their notebooks. They construct the shape in free horizontal projection, or simply sketch it. They describe the shape, including its characteristics of volume and surface area.

Recommended grade: 9.

Object of activity: Practice of equations for the determination of surface areas and volumes of shapes

Target language: Area of a shape, volume of a shape, formula, prism, block, cube, pyramid, cone, cylinder, sphere

Aids: Work sheet with domino, word search puzzle

Time allowed: 15 minutes

- The students are given a cut-out domino and play in pairs, groups of three or four, and pairs/teams compete.
- They play according to the rules of dominoes. The basic rule of dominoes is that they must use cards divided in half containing individual problems. The player places another card beside an arbitrarily chosen card, so that it corresponds to half of the previous card, i.e. to one half of the card already placed; the cards are arranged in a line and the problems accordingly follow one other.
- The students always name the shape, or read the equation for calculating the volume and surface area, as required (only advanced English classes).

Classroom language:

S equals two pi /pai/ r open brackets r plus v close brackets. Where S is the surface area, r is the radius, and v is the height.

$$S = 2\pi r(r + v)$$

V equals four over three pi r cubed. Where V is the volume, and r is the radius.

$$V = \frac{4}{3}\pi r^3$$

S equals six a squared. $S = 6a^2$

S equals 2 open brackets a b plus b c plus ac close brackets

$$S = 2(ab + bc + ac)$$

Supplementary activity:

The students try as quickly as possible to find all the words in the word search. They must determine their correct pronunciation and the Czech equivalents as homework. They can check and practice the pronunciation in the next English lesson (arranged in consultation with our colleague).

More information is available at:

<http://education.ilab.org/beamsactivity/6thgrade/geometrywordsearch/stu01.1.html>.

Recommended grade: 9.

Object of activity: Practice of calculation of the volumes of shapes

Target language: *block, cylinder, volume, height, diameter of a circle, radius of a circle, length of an edge, bigger/smaller by (2 mm), cubic centimetre*

Aids: Two boxes of candy of the same type (preferably one cylindrical shape and one cone shape, e.g. Smarties in a round and polyhedron box), candy, paper or notebook

Time allowed: 15 minutes

- The students work in pairs and each student brings a box of candies. They should decide in advance on their type; the boxes must not be the same.
- The students guess which box holds more candy and they verify their results by pouring the candy from one box to the other.
- They calculate the amount of candy by which the volume of the boxes differs.
- They estimate by how many cm^3 the volumes differ.
- They verify their estimates by calculation and then measure it as precisely as possible. They record their calculations on paper or in their notebooks.
- The students present their findings to the others.
- After the work has been completed, the students are rewarded; they divide the candy among themselves and eat it.

Classroom language:

Try to guess which box can hold more sweets.

Zkuste hádat, do které krabičky se vejde více bonbónů.

Find out by removing the sweets of one box to the other.

Přesvědčte se přesypáním bonbónů z jedné krabičky do druhé.

By how many sweets does the volume of the boxes differ? O kolik bonbónů se objem krabiček liší?

By how many cm^3 does the volume of the boxes differ? O kolik cm^3 se liší objem krabiček?

Calculate and measure.

Spočítejte a změřte.

This box can hold more sweets.

Do této krabičky se vejde více bonbónů.

The volume of the boxes differs by... sweets.

Objem krabiček se liší o... bonbónů.

The volume of this box is...

Objem této krabičky je...

Recommended grade: 9.

Object of activity: Practice of the names of shapes and equations for calculating their volumes and surface areas

Target language: *Shape, body, area, volume, height, prism, block, cube, pyramid, cone, cylinder, sphere, radius*

Aids: Worksheet, scissors

Time allowed: 15–20 minutes

- The students receive a pre-cut game of pexeso. We can combine the cards as needed; either the students receive all of them and look for the group of four (picture of the shape, expression, equation for calculating the area and equation for calculating its volume), or they look for a group of only three (picture, equation for calculating the area and equation for calculating the volume), or a pair (picture and expression, picture and one of the equations, expression and one of the equations).
- They play in pairs, in groups of three or four.
- According to the rules of pexeso, the students look for the corresponding / matching cards.
- After each card has been turned over, the students name the shape or read the name of the shape, if applicable, and also read the equation for calculating its surface area/volume. We can play several rounds of the game, so that the students adequately memorize the English expressions and the equations.

Classroom language:

S equals two pi /pai/ r open brackets r plus v close brackets. Where S is the surface area, r is the radius, and v is the height.

$$S = 2\pi r(r + v)$$

V equals four over three pi r cubed. Where V is the volume, and r is the radius.

$$V = \frac{4}{3}\pi r^3$$

S equals six a squared. $S = 6a^2$

S equals 2 open brackets a b plus b c plus ac close brackets

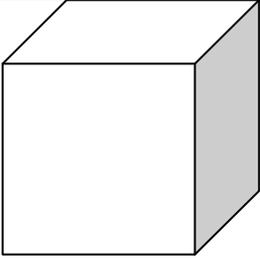
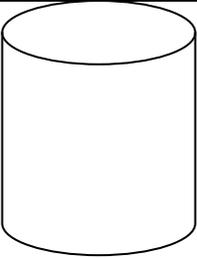
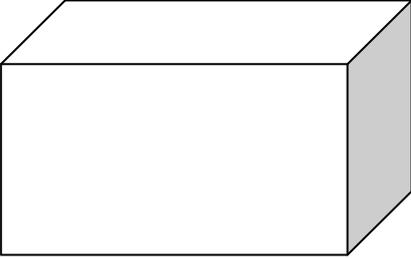
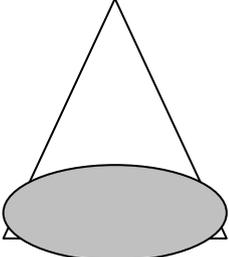
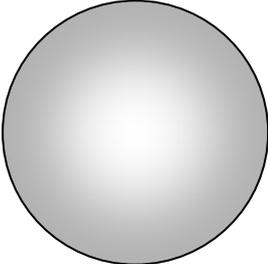
$$S = 2(ab + bc + ac)$$

Alternative:

The same game can be applied to a topic of our choice, e.g. solving unknown variables, percentages, and decimal numbers.

Supplementary activity:

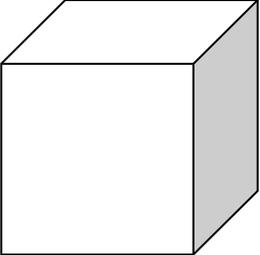
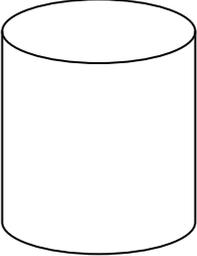
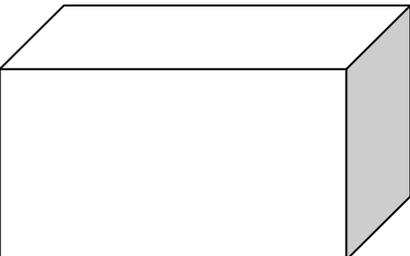
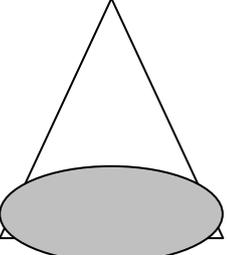
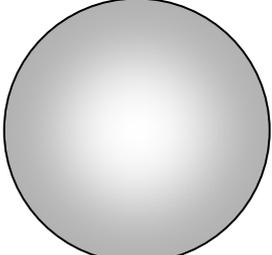
Write a description for each shape. Think carefully about their properties.

	<p>This 3D shape is a _____ . It has</p>
	<p>This 3D shape is a _____ . It has</p>
	<p>This 3D shape is a _____ . It has</p>
	<p>This 3D shape is a _____ . It has</p>
	<p>This 3D shape is a _____ . It has</p>

Cube	Cylinder:	Cuboid	Cone	Sphere
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3D Shape Properties

Match the shapes to the correct descriptions.

	<p>This 3D shape has no flat faces and no straight edges. It has just one curved face. It is a _____ .</p>
	<p>This 3D shape has one curved face and one flat face. The flat face is a circle. It is a _____ .</p>
	<p>This 3D shape has 6 flat square faces, 12 straight edges and 8 corners. It is a _____ .</p>
	<p>This 3D shape has one curved face and 2 flat circular faces. It is a _____ .</p>
	<p>This 3D shape has 6 flat faces; 2 are squares and 4 are rectangles. It has 12 straight edges and 8 corners. It is a _____ .</p>

Cube	Cylinder	Cuboid	Cone	Sphere
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Characteristics of functions

Recommended grade level: 9.

Purpose of the activity: Differentiation of the properties of functions, sets of domains

Target language: *Linear and quadratic functions, increasing, decreasing, constant functions, function property, set of domain, domain of values, charts/graphs*

Aids: Worksheets with graphs, interactive table or data projector, paper

Time allowed: 15 minutes

- Each student receives a worksheet with illustrated graphs and functions.
- The student uses a sheet of paper on which to write his/her answer.
- We ask questions and the students write their answers on paper.
- We jointly check the answers and the students award themselves a point for every correct answer. The student with the highest number of points, wins.
- Lastly, they jointly explain their answers if possible, using an interactive table or data projector.

Classroom language:

Which graphs are graphs of a function?

Který graf je grafem funkce?

Which graphs are the graphs of a linear function?

Které grafy jsou grafy lineární funkce?

Which graphs are the graphs of a quadratic function?

Které grafy jsou grafy kvadratické funkce?

Which functions are increasing/decreasing/constant?

Které funkce jsou rostoucí/klesající/konstantní?

Determine the domain for which the function is defined in graph 3.

Urči definiční obor

č. 3.

Determine the domain for which the function is defined in graph 5.

Urči definiční obor

č. 5.

Alternative 1:

If the lesson is divided into two halves, we can prepare graphs on paper which we place on the walls round the classroom. The students walk round, look for the corresponding functions and record them on their paper.

Alternative 2:

The students trace graphical linear functions in their notebook. They write their properties (increasing, decreasing, constant) and they find the formula of the function. They do the same for the quadratic functions.

Maze with fractions

Recommended grade: 7.

Object of activity: To reach the other end of the maze by calculating fractions

Target language: Reading fractions; *by, multiplied by, equal*

Aids: Maze drawing (game board), blackboard or wall, chalk, sticks, stones, nets and string

Time allowed: 15 minutes

- We copy the worksheets with the maze, enlarge them, fasten them on the blackboard/wall, or place them on the floor at an adequate distance from one another.
- The students form teams and each team stands next to the game board.
- The students must calculate on each occasion what the value of the given total is, so that they know which path to continue on in the maze (they always have two results to choose from). They always mark the correct result.
- The team arriving at the destination first (i.e. the treasure), wins.
- Lastly, we traverse the maze route as a class. The students describe fully how they arrived at the correct result: *“Three quarters of sixteen: sixteen divided by four equals four, and four multiplied by three equals twelve, so we go to that answer.”*

Classroom language:

*Three quarters of sixteen,
sixteen divided by four equals four,*

and four multiplied by three equals twelve,

so we go to that answer.

$\frac{3}{4}$ z 16 (tři čtvrtiny z šestnácti),
 $16 \div 4 = 4$ (šestnáct děleno čtyřmi
rovná se/jsou čtyři)

a $4 \times 3 = 12$ (čtyři násobeno
třemi/krát tři rovná se/je dvanáct),
takže jdeme na tuto odpověď.

Supplementary activity:

The students write down the entire procedure (see example under the maze) for each calculation.

Alternative:

We can create a real maze somewhere else. In the classroom or the gym, we draw paths on the floor with chalk. The students must go along them to find the destination. In good weather we can create a maze either in the school yard or on a paved area; using chalk to draw the paths or stones, sticks or nets placed on the grass (push the sticks into the ground and lead the string between them).

Mathematical expression – Bingo

Recommended grade: 9.

Object of activity: Comprehension of mathematical expressions

Target language: See expressions on bingo cards

Aids: Bingo cards, small cards, bag

Time allowed: 15–20 minutes

- We cut up the first sheet containing the correct pronunciation of all expressions into small cards and place them in the bag.
- The students play singly, or in pairs. Each student receives a Bingo card with nine squares, or a square grid measuring 3 x 3 spaces, on which the mathematical expressions in the bag are written.
- We take the first card from the bag and read it aloud. If any student has a mathematical expression on his/her Bingo card, which corresponds to the one we read, he/she must cross out the square.
- We take out one card after another and the students gradually cross them out.
- The student crossing out all expressions on his/her Bingo card first, wins.

Circumference and area of a circle

Recommended grade: 7.

Object of activity: Calculation of the circumference and the area of a circle, to obtain three correct answers in a row, in a column, or across before the opponent

Target language: *Circumference, area of a circle, diameter, radius*

Aids: Worksheet, blackboard, picture of a circle, soft ball

Time allowed: 15 minutes

- We copy a drawing of the circle from the worksheet on the blackboard (we do not have to use all of them), or create a copy in large format so that all the students can see it.
- We divide the class into teams. Each team receives one soft ball and chooses a symbol/logo, e.g. circle, cross.
- The first team throws the ball at one of the squares on the blackboard. It must solve the square which they hit, or the question located in the square. The other teams also do the calculation because if the first team does not answer correctly, the next team in line is given the opportunity.
- The students calculate the circumference, the area, the radius or diameter of the circle. They reply: *“The circumference of this circle is 9.4 cm.”* Or: *“The circumference of a circle whose diameter is 3 cm, is 9.4 cm.”* They can round off to the nearest decimal.
- The object is for every team to create the greatest number of correct answer triads vertically, horizontally, or diagonally. Every time they give a correct answer, we cover the square with a card with the correct result and mark it with the team's symbol.
- The team which returns the largest number of correct answer triads, wins and receives a reward.

Classroom language:

Throw the ball at the squares, please.

Hod' míčkem směrem na čtverce, prosím.

Solve the problem / answer the question.

Vyřešte problém / odpovězte na otázku.

Get three in a row, down or across.

Získejte tři v řadě, sloupci nebo napříč.

The circumference of this circle is 9.4 cm.

Obvod kruhu je 9,4 cm.

The circumference of a circle whose diameter is 3 cm, is 9.4 cm.

Obvod kružnice, jejíž průměr je 3 cm, je 9,4 cm.

Correct answers:

9.4 cm	12.6 cm	10.0 cm	2.01 cm ²
40.8 cm	7.0 cm	7.1 cm ²	50.3 cm
113.1 mm ²	56.5 mm	11.0 cm	50.3 cm ²
6.0 cm	254.5 cm ²	4.7 m	19.6 m ²
14.0 cm	10.7 cm	12.6 cm ²	804.2 m ²