

Numeracy

For mental and written arithmetic exercises at different levels, visit The Playground at www.greatschoolrun.org/play/

Learning about distances

Children can measure out their running route, both for the run and for training sessions. They can do this by using a measuring wheel or sports tape measure. If a point-to-point route is chosen, a scaled drawing can be used. If the route involves laps, one full lap can be measured and subsequent laps calculated to reach the selected distance. If planning shuttle runs, the length of the hall can be measured and the appropriate number of runs calculated.

Track distances can be measured and used for training - 100m, 200m, 400m, 1500m.

After the event, race results can be used to create charts and graphs. These can be compared with results from earlier years if data is held to identify and examine trends.

Measuring Energy

Energy can be measured in either joules or calories. A joule (J) can be defined as the energy used when 1 kilogram (kg) is moved 1 metre (m) by the force of 1 Newton (N). A calorie (cal) can be defined as the energy needed to raise the temperature of 1 gram of water from 14.5 to 15.5°C. In practice, both units are used, just as different units are used to measure liquids, e.g. pints and litres. Use the information below to create some mathematical puzzles for children or use food labels to get children to calculate the conversion rates used by food manufacturers.

People use large amounts of energy so nutritionists use larger units.

1 kilojoule (kJ) = 1,000 joules

1 megajoule (MJ) = 1,000,000 joules

To convert from one unit to another:

1 kcal = 4.184 kJ

1 MJ = 239 kcal

So a 1000 kcal diet provides 4.184 MJ or 4,184 kJ

Calculating Energy Needs

Children should be encouraged to think about both what and how much they eat to see if they are providing themselves with the right kind of energy in the right amounts to stay fit and well. While teachers will be aware of the need to avoid a pre-occupation with body weight and calories, they can use the following material to form the basis of mathematics exercises. Children can work out how much they need to eat of each of the major food groups by weight. This, in turn, will help them to shop for food using food labels on packaging.

How Much (of what) Should I Eat?

- 1 TO CALCULATE DAILY CALORIE NEEDS (Kilocalories):

Guideline daily amounts for children aged 7-10 show that, on average, boys need around 1950 calories per day, and girls 1750. The example below uses 1750.

- 2 TO ENSURE THAT AT LEAST 55% OF THESE KCALORIES COME FROM CARBOHYDRATE SOURCES:

$$1,750 \times 55\% = \text{around } 963 \text{ carbohydrate calories}$$

- 3 TO ENSURE THAT 15% OF DAILY INTAKE COMES FROM PROTEINS:

$$1,750 \times 15\% = \text{around } 263 \text{ protein calories}$$

- 4 TO ENSURE THAT AT LEAST 30% OF DAILY INTAKE COMES FROM FATS:

$$1,750 \times 30\% = \text{around } 525 \text{ fats calories per day.}$$

- 5 TO CALCULATE THE AMOUNT OF FOOD YOU NEED TO CONSUME:

Calorie counting is tedious, and sometimes impossible, and it may be more useful to work out the *amount* of food you need to eat, using weighing scales or food labels. All you need to know is that:

1g of carbohydrate = 4 calories
1g of protein = 4 calories

1g of fat = 9 calories

So, for carbohydrate, divide daily calories (eg 963) by the calories per gram (4) and you know that you are aiming to eat 240 grams of carbohydrate per day. Divide protein calories by 4 (= 65 grams), and fat calories by 9 (= 58 grams).

With this information, children can calculate how many grams of each kind of food they need to eat. Children can compare their results with national

guidelines for recommended levels at http://www.betreatwise.org.uk/BeTreatwise_GetToKnowYourGDAs_GDAsForChildrenAndTeens.asp Note; this site is published by 'Be Treatwise' companies – Mars, Cadbury Schweppes Plc and Leaf UK. The data quoted, however, is that of The Institute of Grocery Distribution (www.IGD.com) and is supported by the British Nutrition Foundation.

Energy Consumption

Using the data below, children can work out how to achieve an **energy balance** by fuelling their physical exercise. The more they exercise, the more calories they need and can consume (maintaining the balance above).

Calories burned *per hour* by someone weighing 30-35 kg:

- Walking (strolling) – 50 kcal
- Walking steadily - 75 kcal
- Walking (briskly) – 100+ kcal
- Cycling – 150 kcal
- Gymnastics/aerobics classes – 195 kcal
- Swimming continuously - 300 kcal
- Running (10 minutes/mile) – 300 kcal
- Running (8.5 minutes/mile) – 345 kcal

Note: such a list can only ever be an estimate as an accurate calculation requires detail of body weight and of exercise intensity. However, figures can be used as a guide and as an approximate way of calculating children's energy needs when training for the Tesco Great School Run. Bearing in mind that national guidelines suggest children should be doing around an hour's physical exercise a day (not necessarily in one go), they can add this to their calculations above and modify them accordingly.

A Food Diary

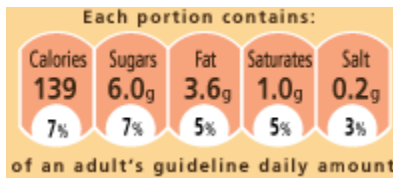
Children can keep a food diary/blog for a week using their own meal plan (see Health and Well-being), make a rough calculation of how many grams of each food group they have eaten.

An Activity Diary

Children can keep an activity diary/blog for a week and calculate their extra energy needs as a result.

Calculating Guideline Daily Amounts (GDAs) of the Major Food Groups

Good athletes always need to be ready for action and this means having lots of energy. Children can be encouraged to think about energy in foods. We have seen how they can count calories or learn about guideline daily amounts of different food groups. GDAs are a guide to the total amount of energy a typical healthy person should be eating in a day, by food group. Children need to know that they should eat from each food group but in varying proportions, limiting those foods (such as saturated fats, salt and sugar) that can have damaging effects on their health if eaten to excess (see Health and Well-being).



An example of a food label

GDA's for children can be found at http://www.betreatwise.org.uk/BeTreatwise_GetToKnowYourGDAs_GDAsForChildrenAndTeens.asp. Note; this site is published by 'Be Treatwise' companies – Mars, Cadbury Schweppes Plc and Leaf UK. The data quoted, however, is that of The Institute of Grocery Distribution (www.IGD.com) and is supported by the British Nutrition Foundation.

Children can be asked to bring food packaging into class, and to use the guideline daily amounts on panels like the one above to plan balanced meals for their needs (see also Health and Well-being).

Research Project: Who eats 5-a-day?

Children conduct research into what constitutes 5 portions of fruit and veg (www.5aday.nhs.uk).

Create a questionnaire that will collect the data required to establish the number of fruit and vegetable portions eaten per day by each child in class (by number).

Create charts and graphs that illustrate:

Average (mean, median and mode) number of portions eaten
Greatest number
Smallest number

Discuss ways of increasing intake even if data show an average intake of 5. More is better!

Create a pie chart of the 'Eatwell Plate' (<http://www.food.gov.uk/images/pagefurniture/eatwellplatelarge.jpg>) showing relative proportions of each food group.