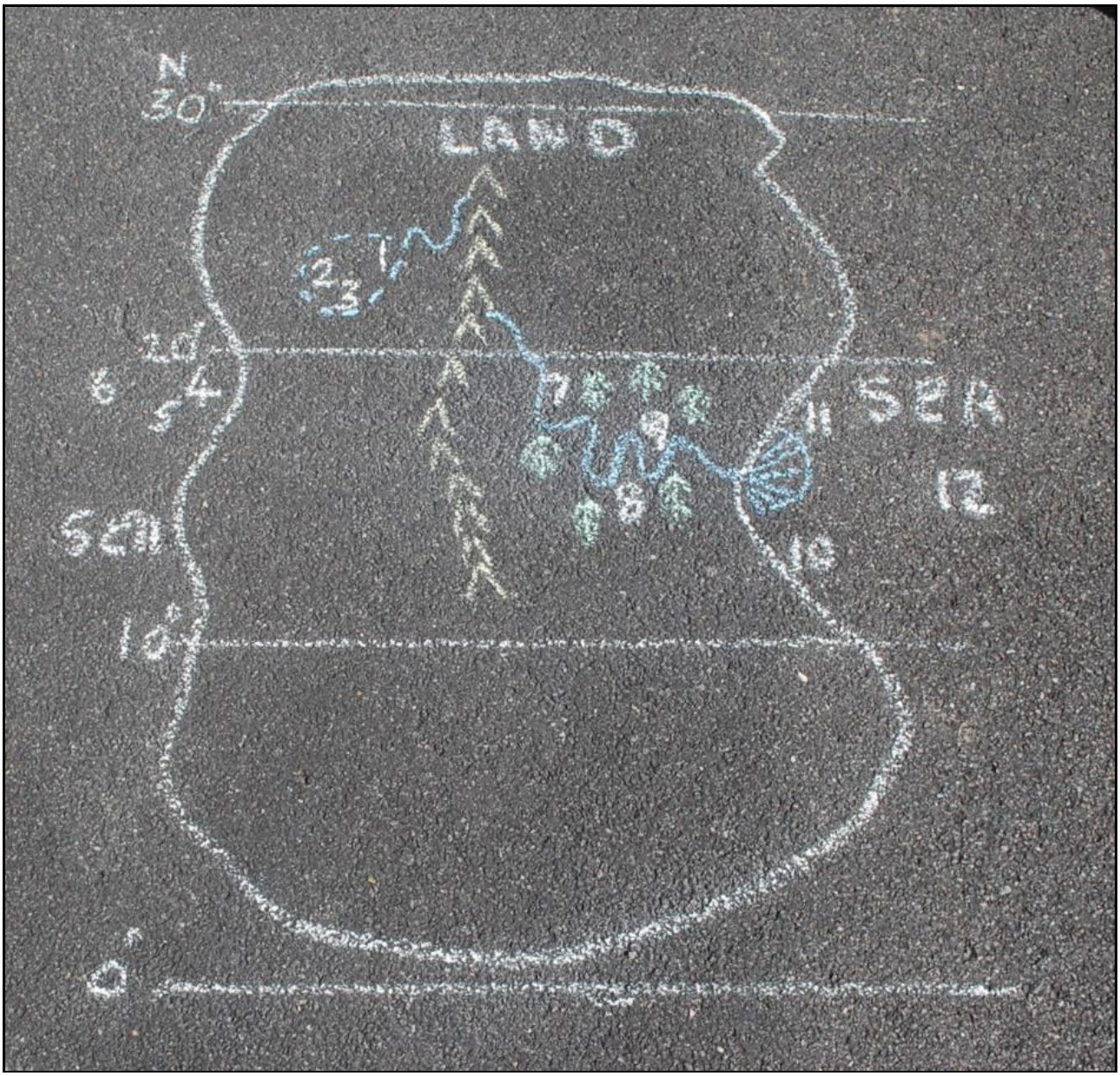
Playground continents
A palaeogeography in your school yard

Use your “best” specimens on a map of a continent chalked on the ground in your school yard, to demonstrate how a palaeogeography may be reconstructed from the evidence of the rocks. An example is given here using photographs of specimens, which may be cut out and used by your class, but you can also devise your own continent, or a simpler local example, depending on what specimens you have in your collection. Point out that some rocks may be formed at various depths under the sea, in rivers, or on the land and their features may give clues about their origin. Fossil content also provides vital evidence. Climate plays an important part, too and it may be possible to deduce whether the climate was arid or humid tropical, for example.

If you are using the examples given here, first draw the continental outline with playground chalks, allowing enough space to lay out the photographs, and number the localities as shown. Cut out the photographs and ask the class to position each one where they think the rock or fossil it shows might have been formed. There are several places where the photos are interchangeable, but pupils should be able to give their reasons for their positioning.

(A large sheet of paper and felt-tipped pens may be used in a classroom activity).



A continental outline drawn in chalk. Latitude shown on the left side; yellow points = mountains; green shapes = forest; blue lines = rivers/delta; blue dashes = temporary lake. Numbers = likely locations of specimens.

Specimens (The 1p coin is 2cm in diameter)

A. Mudstone with more recent borings.

B. Salt (halite) pseudomorphs on base of red mudstone.

C. Breccia.

D. Fossil fern leaves in mudstone.

E. Flute marks on base of sandstone bed.

F. Colonial coral fossil in limestone.

G. Coal.

H. Infilled desiccation cracks on base of siltstone.

I. Goniatite fossils in limestone.

J. Cross-laminated sandstone.

K. Solitary coral fossil in limestone

L. Ripple-marked sandstone.

The back up

Title: Playground continents

Subtitle: A palaeogeography in your school yard

Topic: Match a set of specimens or photographs to their probable location on a map of an imaginary continent, drawn on the playground surface or on paper in the classroom.

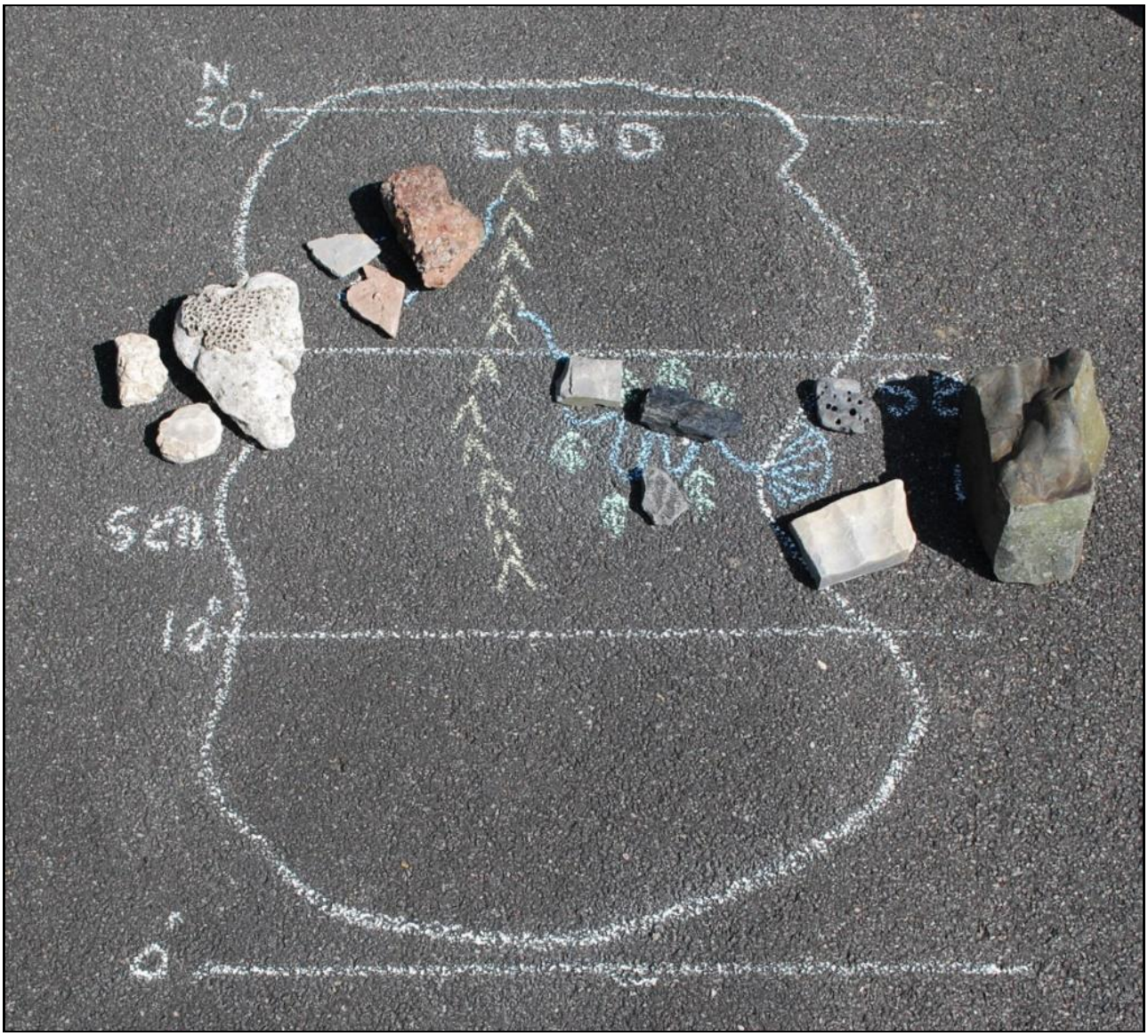
Age range of pupils: 14 years upwards

Time needed to complete activity: 20 minutes

Pupil learning outcomes: Pupils can:

- evaluate the clues in a geological specimen regarding its origins;
- place specimens, or photographs of them, at their appropriate location on a map of a continent;
- justify their conclusions in discussion with their classmates.

Context: This topic provides an excellent link between evidence in the geological record for former climatic regimes and modern geography. It could well be run in liaison between the science and the geography departments. Our "answers" are shown below. Interchangeable specimens are shown, e.g. B/H.



The "continent" showing suggested locations for the specimens in the photographs above (*All photos by Peter Kennett*)

Answers:

1. C. breccia – mostly angular fragments deposited in an alluvial fan, where a seasonal river meets a plain;
2. B. salt pseudomorphs, where salt crystals have been dissolved by the next flood and the space infilled with mud (H/B);
3. H. desiccation cracks, resulting from cracking of mud as it dries out, later filled in by silt (B/H);
4. F. colonial coral, in shallow warm sea water;
5. K. solitary coral, may be in rather deeper warm sea water than the colonial coral;

6. I. goniatites – fragile swimming sea creatures preserved away from the coastal environment;
7. J. cross-laminated sandstone deposited in fast-flowing river currents;
8. D. fossil plant remains (G/D);
9. G. coal – formed in stagnant fresh water (D/G);
10. A. rock surface with holes bored by bivalves (L/A);
11. L. ripple-marked sandstone formed by wave action (A/L)
12. E. flute marks formed by a turbidity current scouring the sea bed and then depositing sand.

Following up the activity:

- Use your own specimens to carry out a similar activity in the school yard. This could be more localised, e.g. a map of a stretch of river and coastline in just one climatic zone.
- Try some other Earthlearningidea activities where the significance of sedimentary structures is investigated in more detail. See Useful Links below.

Underlying principles:

- The Principle of Uniformitarianism states that we can use modern geological features to help understand those of the past.
- The characteristics of many rock specimens enable an interpretation to be made of their likely origin.
- The types of fossils depend on the environment in which they lived or became fossilised, e.g. marine v. fluviatile.
- Control over the climatic belts of the continents today is similar to that of ancient continents.

Thinking skill development: Patterns are established between different environments and the rocks and fossils formed in them. Cognitive conflict may arise when pupils try to allocate specimens to environments. Bridging skills are needed to relate work in the school yard to the real world.

Useful links:
https://www.earthlearningidea.com/PDF/195_Cross_bedding_2.pdf
https://www.earthlearningidea.com/PDF/179_Sole_marks.pdf
https://www.earthlearningidea.com/PDF/Asymmetrical_Ripple_Marks.pdf
https://www.earthlearningidea.com/PDF/53_Environmental_detective.pdf

Resource list: access to a playground with a tarmac or similar surface and some playground chalks;
OR a large sheet of paper and a set of felt-tipped pens;
Suitable geological specimens capable of “telling a story”;
OR photographs of such specimens.

Source: Written by Peter Kennett based on an idea by Chris King, both of the Earthlearningidea Team.