Geology 12
Resource Exam A
Scoring Guide

1. Photograph 9 shows a rock outcrop. Explain how this type of rock may have formed. **(2 marks)**

Data Page 15

KEY

- **weathering, erosion and transportation of pre-existing rock to form coarse-grained sediment (0.5 mark)**
- **compaction and cementation (lithification) of coarse-grained sediment into sedimentary rock (1.5 mark)**
- **accumulation/deposition of sediments (1 mark)**

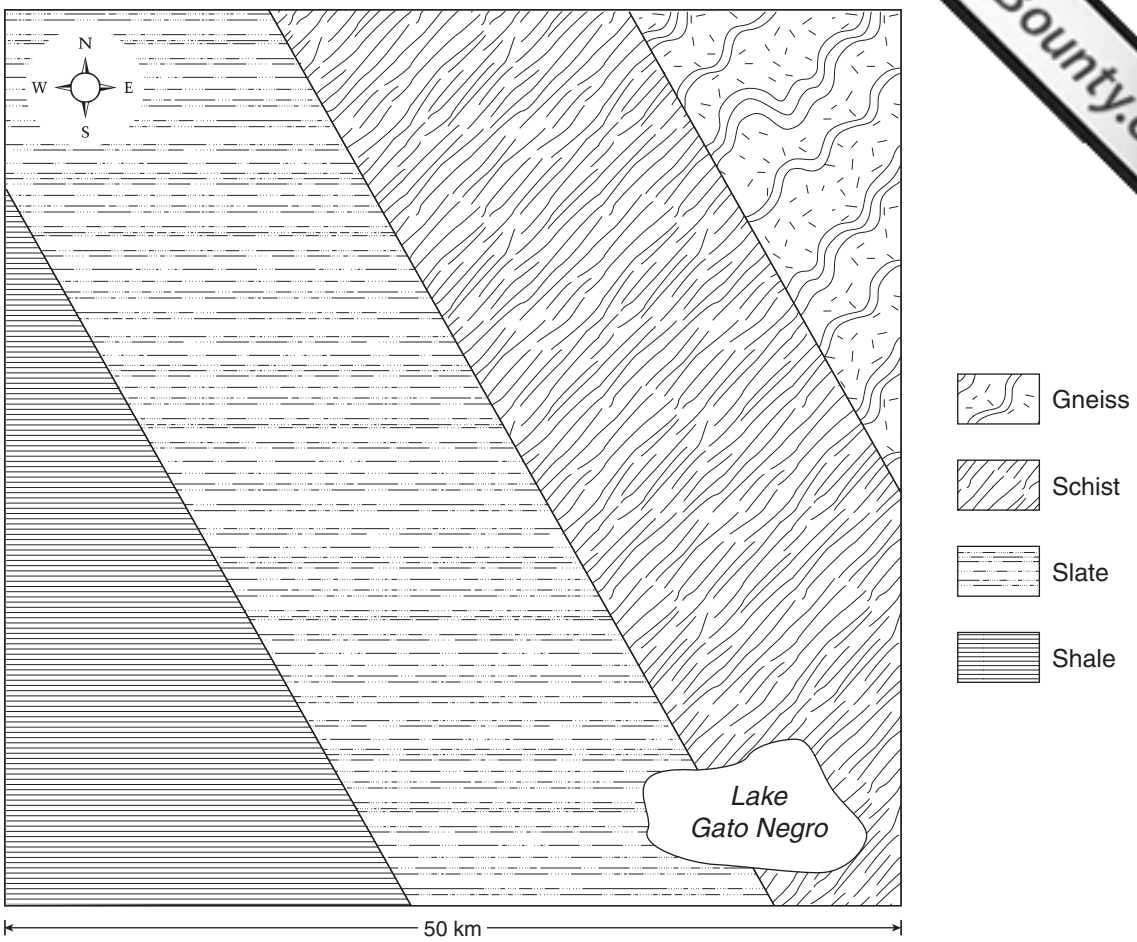
2. The large white clast (fragment) in the centre of the rock in Photograph 9 is igneous. It has a radiometric age of 100 000 000 years. Explain the event this age represents, and how it compares with the age of the formation of the rock. **(2 marks)**

Data Page 15

KEY

- **crystallization of the igneous rock**
- **the fragment is older than the rock that it is contained in**
- **sedimentary rock is younger than the clast**

Use the following geological map to answer questions 3 and 4.



3. Explain in detail how the sequence of rocks shown on the map formed from the original shale. Your answer should refer to an appropriate plate tectonic environment. **(3 marks)**

KEY _____

Temperature and pressure increased towards the northeast (towards the right). ***(2 marks)***

1 mark **for just saying** ***heat and pressure***

Plate tectonic environment:

Subduction zone, continental convergence, folding, etc. ***(1 mark)***

(Regional) metamorphism increases towards the right (northeast) ***(1 mark)***

4. Describe how the texture of the slate would be different from the texture of the gneiss.

KEY _____

The texture of the slate would be extremely fine-grained, with the development of a slaty cleavage, allowing the rock to split into thin sheets.

The texture of the gneiss would be much coarser, with easily visible crystals separated into bands of light-coloured minerals (feldspar and quartz) and bands of dark minerals (biotite mica).

5. A cliff face, part of which is shown below, contains the following features:

   i) One anticline fold structure to the west, one syncline fold structure to the east.

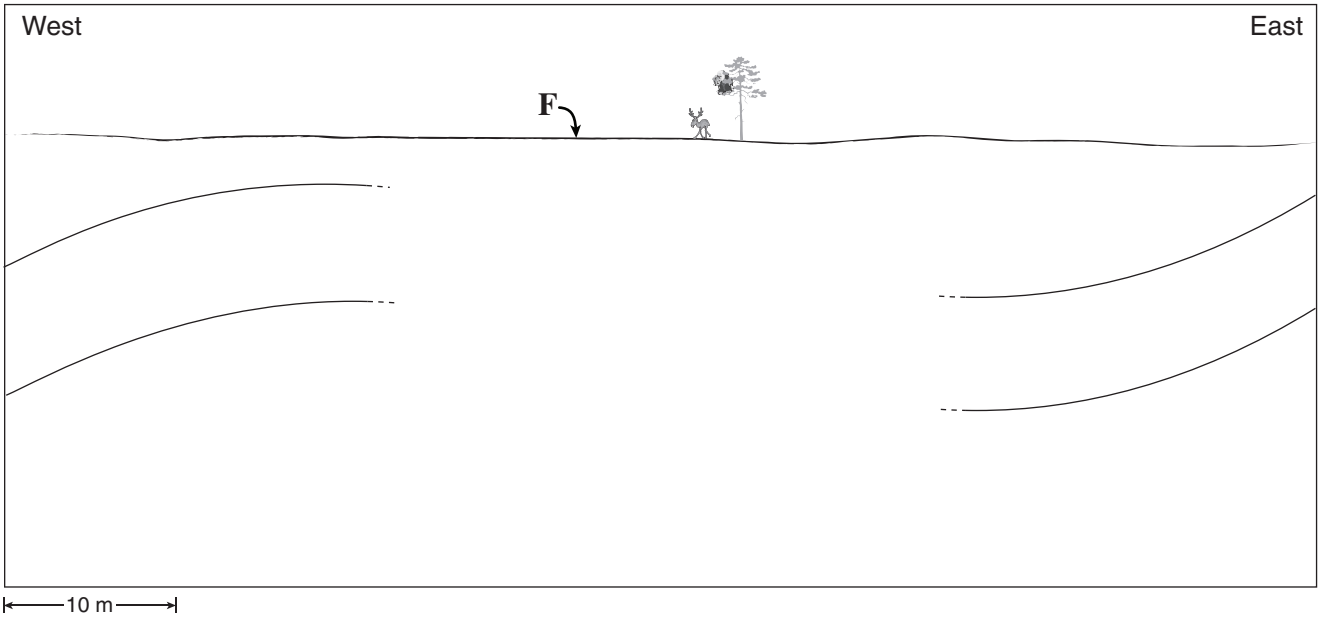
   ii) Three sedimentary rock layers from the Mesozoic Era. Each layer represents a single geological period.

   iii) A reverse fault that dips 75 degrees east, and reaches the surface at **F**. The fault has displaced the rock layers by 5 metres.

   iv) A vertical dike that formed in the Tertiary Period is visible west of the fault.

   In the box below:

   - complete the sketch and label the dike and the fault **(3 marks)**
   - label the three sedimentary rock layers with the geological period in which each would have formed **(1 mark)**
   - correctly draw and label the anticline and the syncline **(2 marks)**



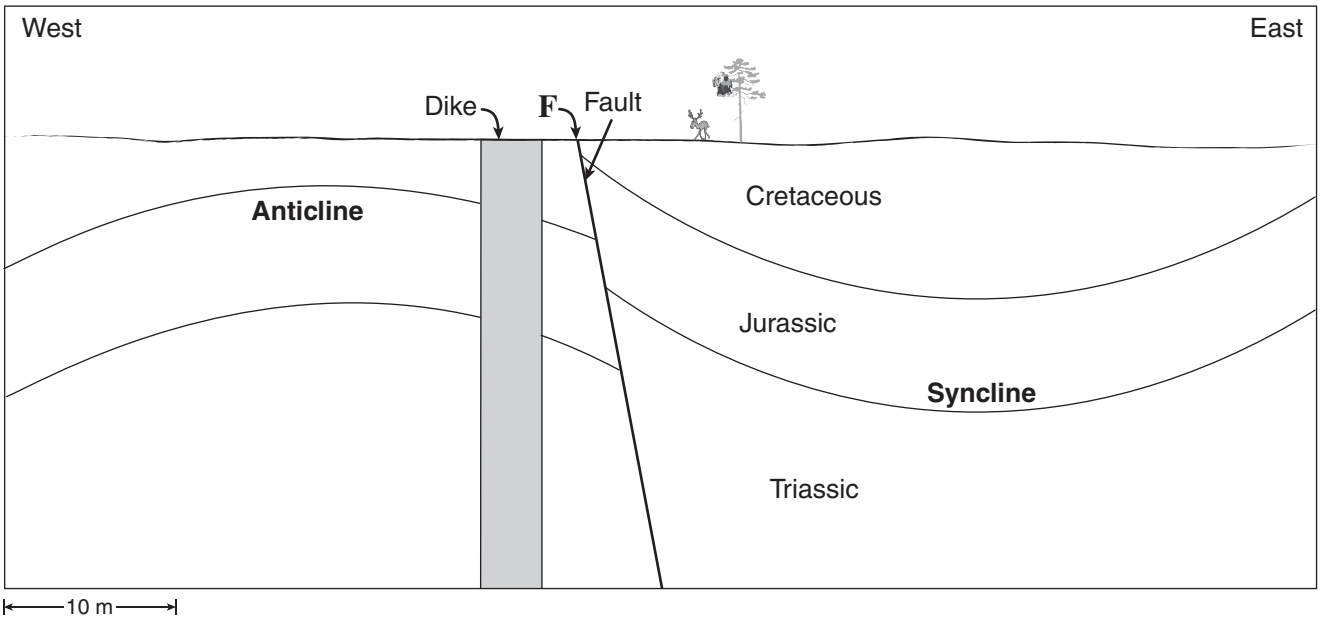
KEY _____

1 mark for showing the proper fault orientation
1 mark for proper pattern of fault displacement
1 mark for dike cutting through anticline
1 mark for the correct order of Periods
2 marks for correctly showing and labelling the Anticline/Syncline structures

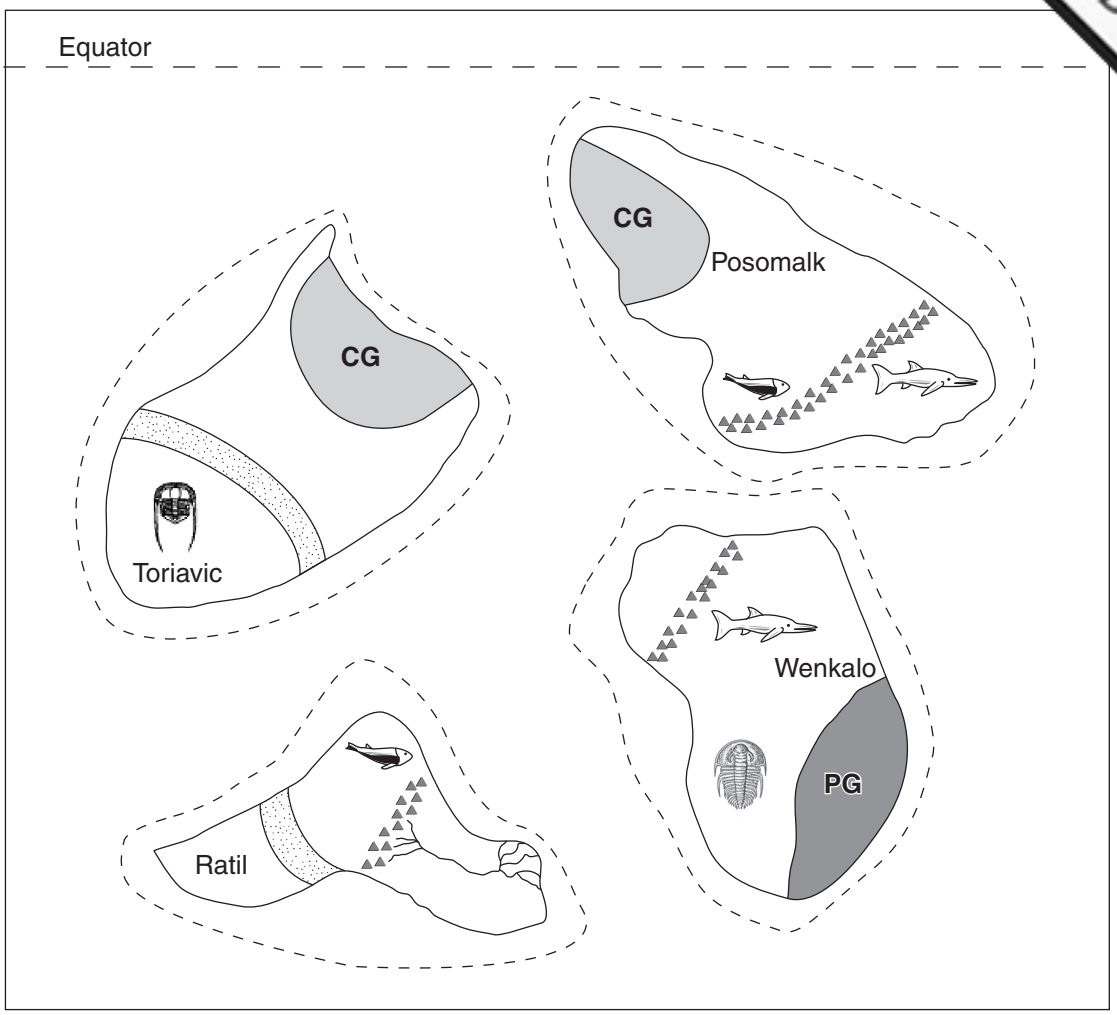
(added from marking)

The marks for the diagram were 1 mark for the dike, 2 for the fault (as indicated in the key), however, the markers awarded marks for the direction and the angle of the fault rather than the displacement of the fault.

0.5 mark if the displacement was more than the width of the bed
Any faults steeper than 45 deg. were given full credit
0.5 mark for dike on the wrong side of the fault (as long as it is vertical)
dike does not need to reach the surface of the cross section to get full marks
dikes not originating from the bottom of the cross section only given 0.5 mark



Use the following map of continents to answer questions 6 and 7.



Silurian freshwater fish

Edge of the continental shelf

Silurian desert sandstone

Cambrian trilobite

CG Area of Carboniferous glaciation

Mountain range – composed mainly of folded, coral-bearing limestone, sandstone and shale

Jurassic marine reptile

PG Area of Pleistocene glaciation

Silurian trilobite

6. The continents shown on the map were once a single land mass. Describe three piec
evidence that proves the continental fragments were once joined together.

KEY _____

Any three for 1 mark each:

- **the continents can be fitted together along the edges of their continental shelves**
- **when the continents are fitted together, the mountain belts line up into a single chain**
- **freshwater Silurian fish can be found on two continents (Ratil and Posomalk). As freshwater fish would not tolerate salty, marine conditions, the continents must have been together at one time.**
- **Silurian desert sandstones match up between Toriavic and Ratil. Continents must have been joined**
- **areas of Carboniferous glaciation match up as well between Toriavic and Posomalk**

Not evidence:

- **trilobites do not match in type or age**
- **Jurassic marine reptiles could have travelled between the continents**
- **area of Pleistocene glaciation has no match on other continents**

(from marking)

General non-specific answers like "fossils" or "glaciers" or "jigsaw puzzle fit" were awarded 0.5 marks

Correlation of plant/fossils was added to Not Evidence

7. The single, original land mass is thought to have formed by the collision of two still older land masses. Describe one piece of evidence, shown on the map, that supports this idea.

(1 mark)

KEY _____

The best evidence of an ancient continental collision is the mountain ranges within the continents of Ratil, Posomalk and Wenkalo. Long, linear mountain ranges within a continent generally form by the collision of two continental tectonic plates and the destruction of an ocean or sea between them.

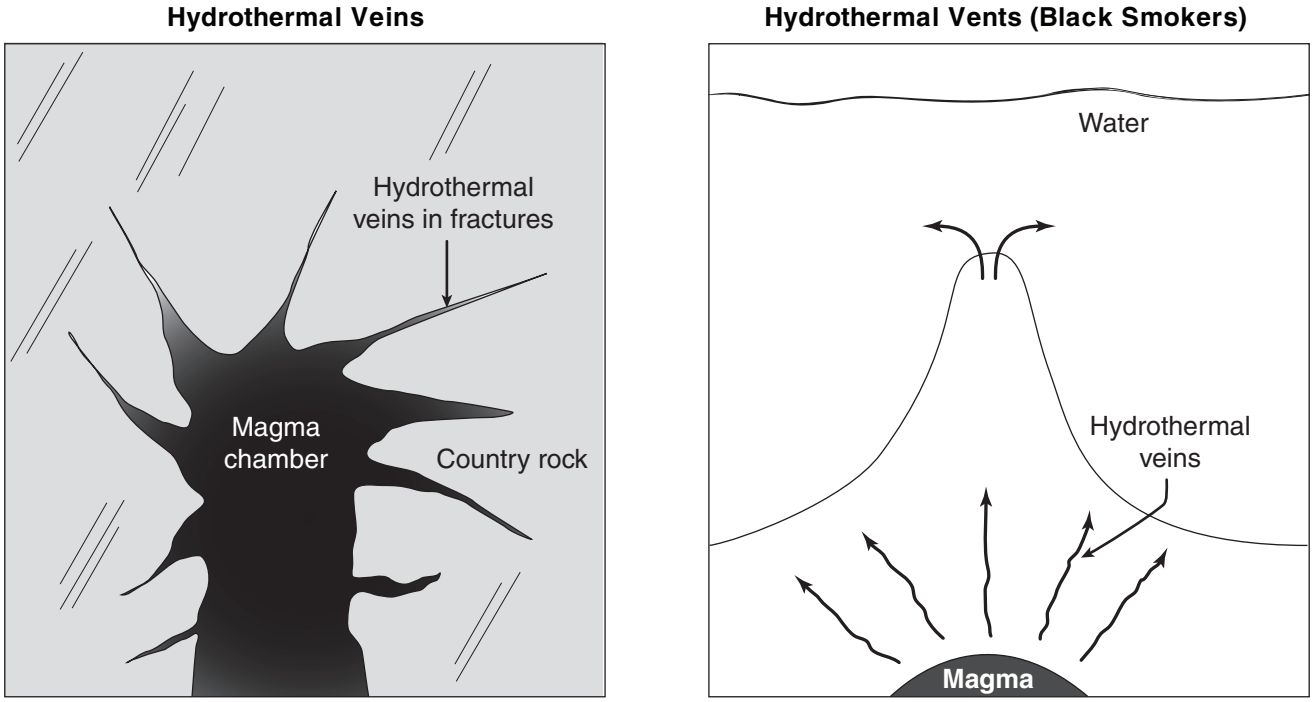
(from marking) answers that were non-specific, brief or overly general like "mountains" were given 0.5 marks

8. Gold is often found in **hydrothermal** deposits. Explain how these deposits may fo
Use a diagram as well as a written description of the process.

Labelled diagram:

KEY _____

1 mark for diagram:



Explanation of the process that concentrates minerals such as gold in this deposit:

KEY _____

2 marks for key ideas in description:

Minerals such as gold (as well as sulphides and silicates) are carried in solution by extremely hot water that is released from magmatic bodies.

Hydrothermal solutions migrate through fractures within the host rock.

The minerals precipitate out as the hydrothermal solutions cool, leaving mineral deposits within the fractures as veins.

Hydrothermal vents/black smokers: magma heats subsurface water under seafloor, minerals precipitate out.

Basic concept: heat, dissolution/dissolving, cooling, precipitation

(From marking Q.8)

Many non-labelled diagrams (if correct) were given 0.5 marks.

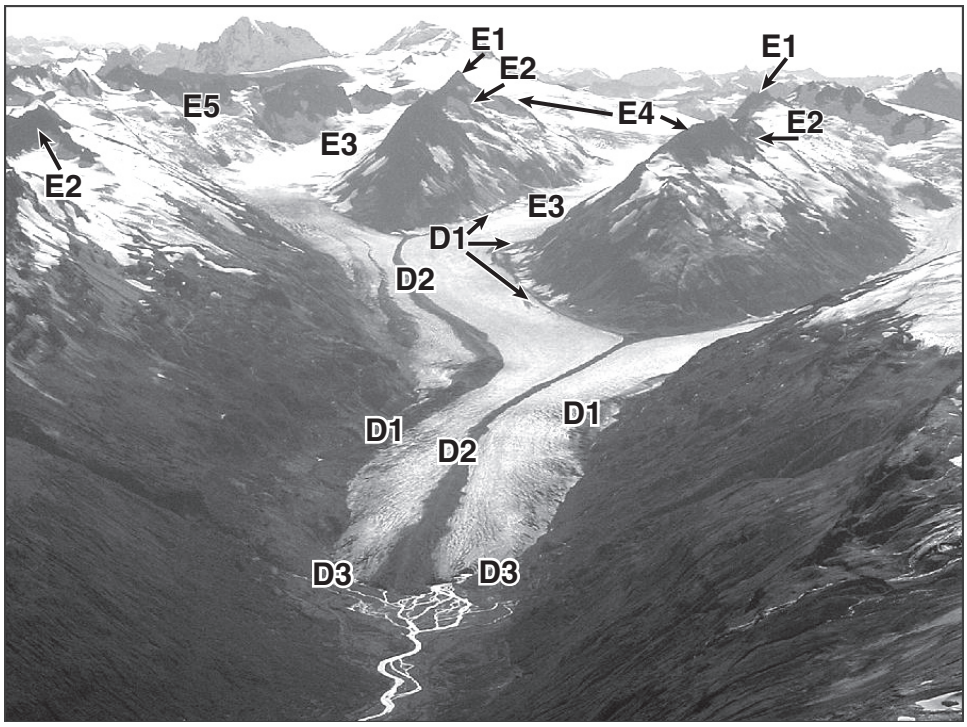
Responses were graded on whether each of the following terms/concepts was described in the answer: heating or heated water (0.5 marks), followed by dissolving metals and gold (0.5 marks), followed by convection, cooling water (0.5 marks) and finally precipitation of metals and gold into veins or fractures (0.5 marks)

9. On the copy of Photograph 10 below, label one glacial **erosional** feature with an **E**, label one glacial **depositional** feature with a **D** and complete the table, giving the name of the feature and its description. **(4 marks)**

KEY _____

½ mark for labelling of erosional feature

½ mark for labelling of depositional feature



Photographer Bruce Molnia, Terra Graphics, AGI Earth Science World Image Bank

(From marking)

Some responses chose glacial features not evident on the photograph, including: esker, drumlin, braided stream, erratics.

1 mark was awarded to features that were glacial features but not displayed on the photograph. These included drumlin, braided stream, esker.

1 mark was given to papers that listed moraine (any type, as long as it was correctly described) as erosional and not depositional.

½ mark for correct name of erosional feature; 1 mark for description

½ mark for correct name of depositional feature; 1 mark for description

Labelled Feature	Description of How the Glacial Feature Formed
Name of erosional feature E:	
E1: horn	**pyramid-shaped peak carved by glacier**
E2: cirque	**bowl-shaped depression at head of glacier**
E3: u-shaped valley	**valley carved by glacier**
E4: arête	**ridge between glaciers**
E5: hanging valley	**glacial valley cut off by larger glacier**
Name of depositional feature D:	
D1: lateral moraine	**glacial deposit at side of glacier**
D2: medial moraine	**glacial deposit running down middle of glacier (indicates the joining of 2 or more glaciers)**
D3: ground moraine	**glacial deposit at bottom of glacier**