Pearson Edexcel Level 3 GCE

Thursday 13th June 2019

Afternoon (Time: 2 hour 15 minutes) | Paper Reference **9GE0/03**

Geography

Advanced

Paper 3

Resource Booklet

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Pearson

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SECTION A

Japan – a hazardous place

Japan is an archipelago made up of four main islands: Kyushu, Shikoku, Honshu, and Hokkaido. Honshu is the largest and most highly populated and provides over 80% of Japan's Gross Domestic Product (GDP).

26% of Japan's total population of 127 million live in the Greater Tokyo region on Honshu.

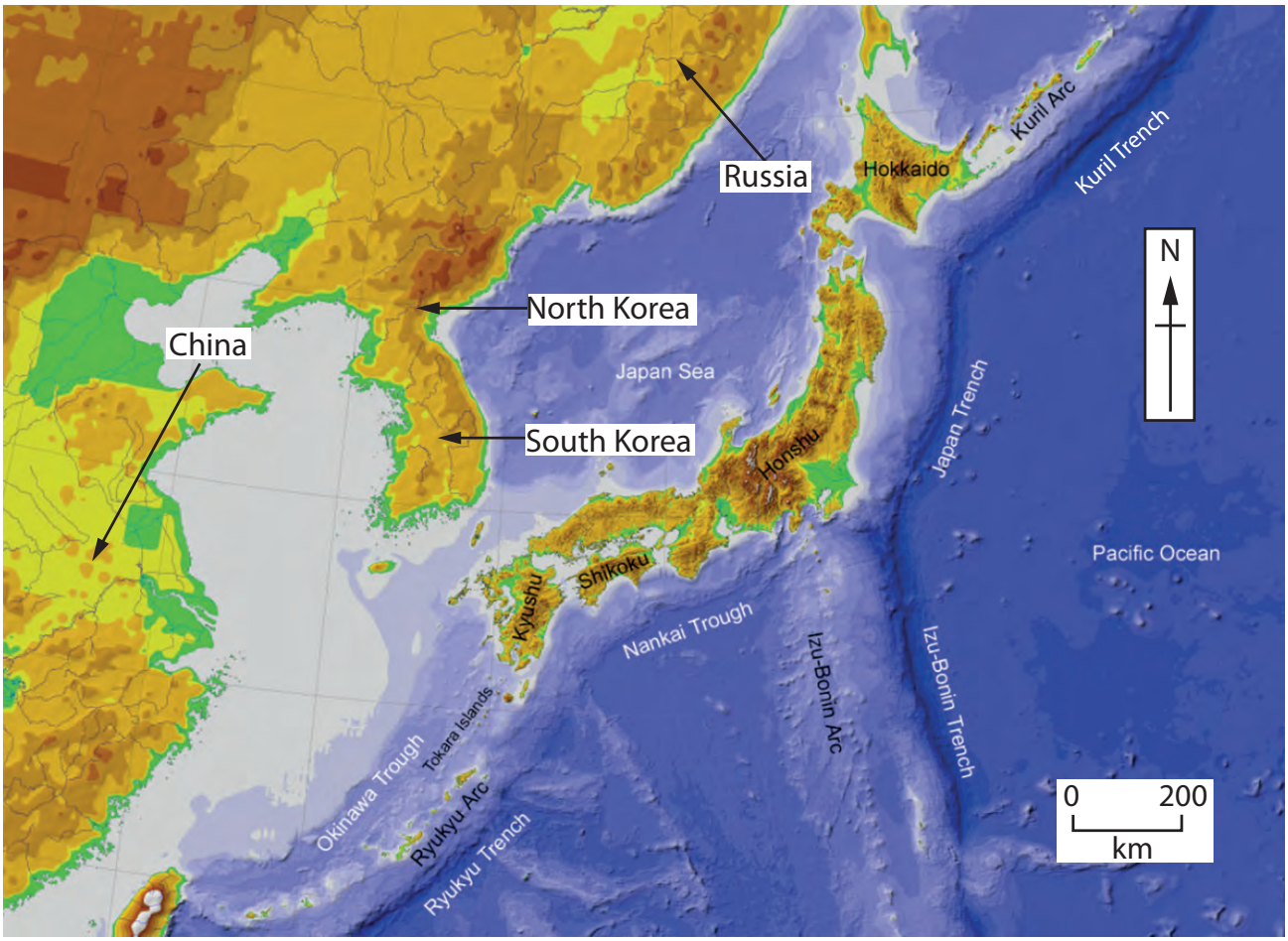
With an average population density of 340 per km^2 Japan is one of the most densely populated countries in the world.

The country is subject to many natural hazards; to earthquakes and associated tsunami, but also eruptions from its 110 active volcanoes – 47 of these pose an imminent threat.

Japan's geologic history as an island-arc system means that it has no natural mineral resources.

With its mountainous interior and steep slopes, over 60% of the country is forested and very little is available for arable farming and food production.

Despite these challenges Japan has the world's third largest economy with very high standards of living. It has one of the healthiest populations resulting in the longest life expectancy globally.



Height above sea-level and depth below sea-level in metres

4000
2000
1500
1000
500
100
50
0
-100
-200
-500
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000
-9000
-10000

Figure 1

Japan in its regional setting

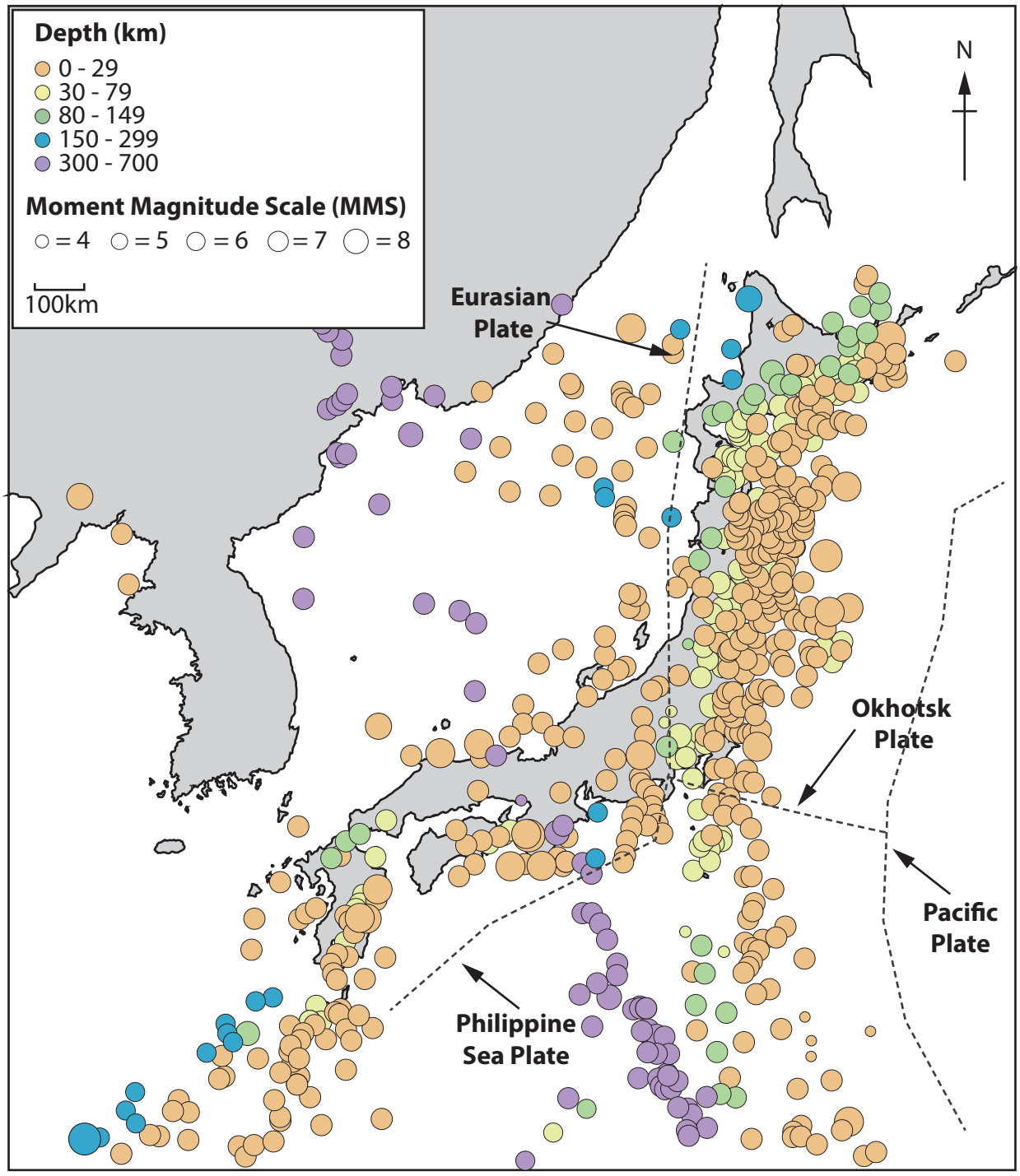


Figure 2

Location and depth of large earthquakes in Japan and its surrounding region, 1960-2015

The Japanese archipelago (islands) lie at the junction of four tectonic plates; the Pacific and the Philippine Sea oceanic plates and the Okhotsk and the Eurasian continental plates.

There are many fault planes where frequent earthquakes are generated by the subduction of the Philippine and the Pacific plates.

20% of all global earthquakes of magnitude 7 or greater (MMS scale) occur in and around Japan with 30 of these events taking place in the past century.

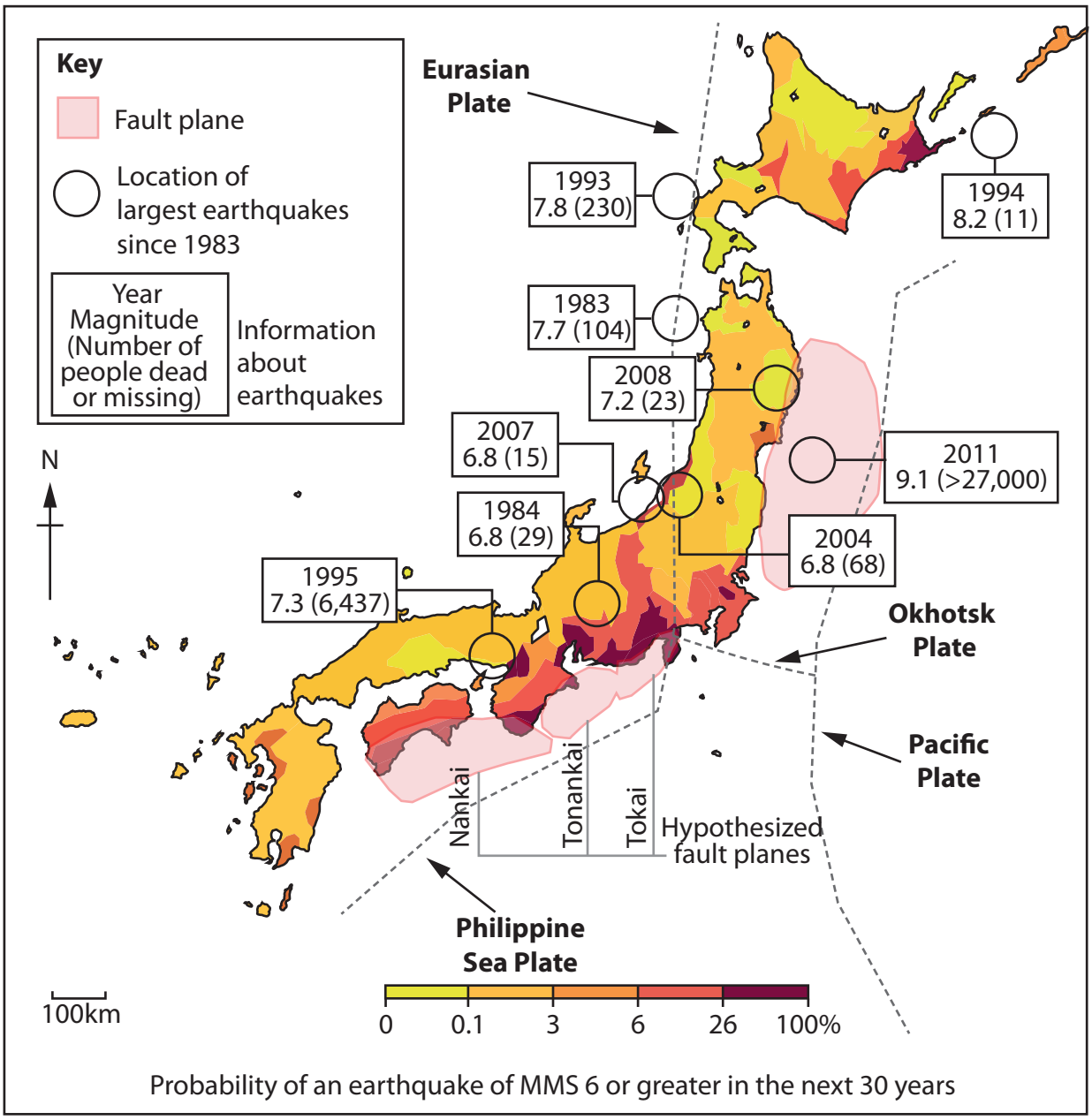


Figure 3

A map of earthquake risk

Although Japan is widely acknowledged as the 'model' state for its level of hazard preparedness and mitigation, this comes at a high economic cost and is not without weaknesses. For example, it is estimated that over 25% of all buildings in the Nankai region (Honshu) have inadequate earthquake resistance.

The most recent catastrophic earthquake (2011 Tohoku) devastated the Japanese economy. Not only did the resulting tsunami kill nearly 30,000 people and displace about 500,000, it also caused the most serious nuclear accident since Chernobyl (Ukraine) at Fukushima.

Additionally, it destroyed over 150,000 buildings and cost over $360 billion in short-term and longer-term economic damage. The global economy was disrupted as the production of vital parts manufactured in Japan ceased causing a bottleneck in the global supply chain for companies as diverse as Apple, Boeing and Nissan.

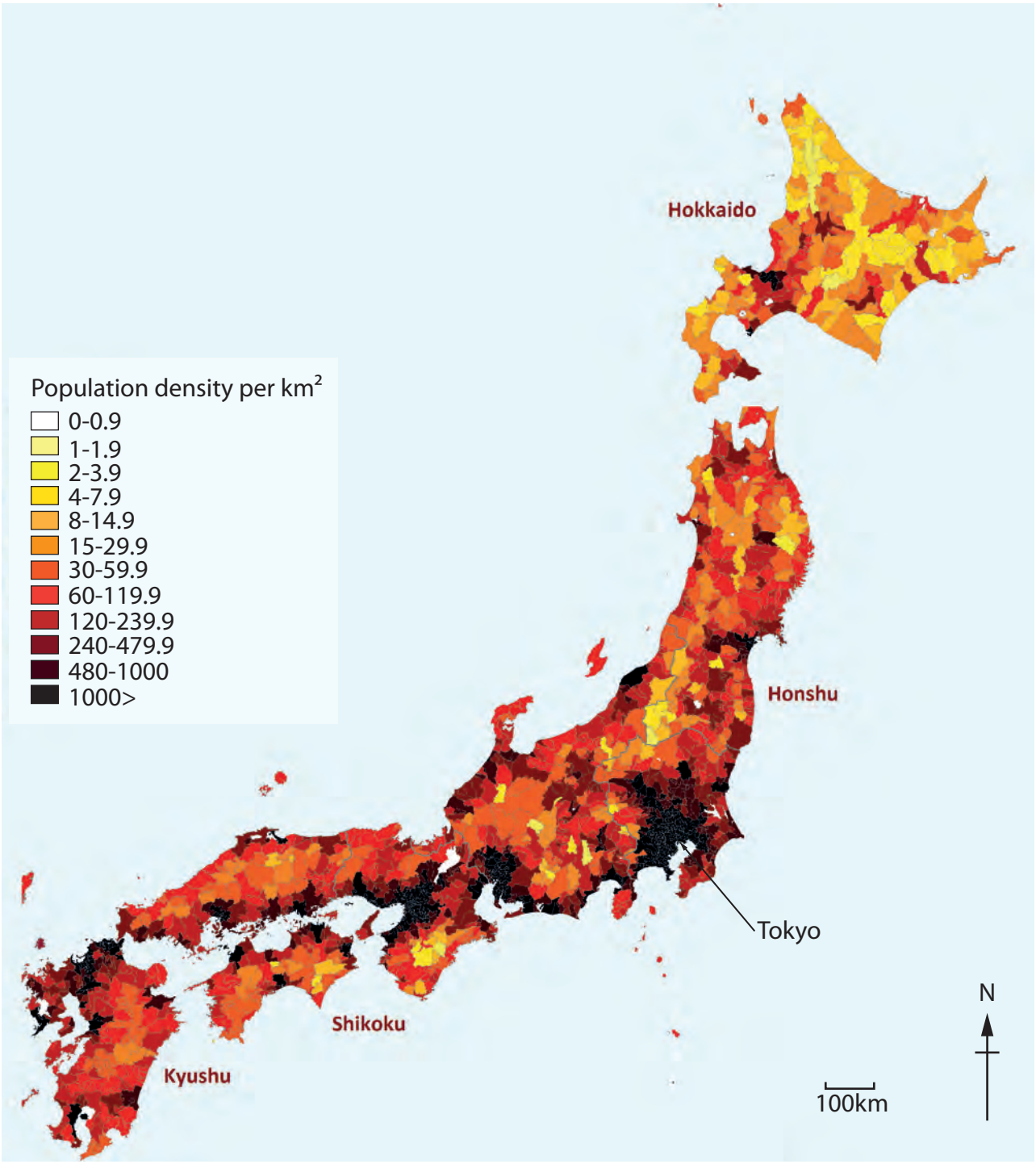


Figure 4

Population density in Japan

SECTION B

Demography, Energy and the Economy

Japan is unusual, although not unique, amongst the world's largest economies in having a declining population.

Estimates suggest that unless current trends are reversed the population will decline by up to a third by 2060 (see Figure 5).

The population is also ageing faster than any other country (see Figure 5) with an estimated 19 million over 80 by 2060. The reasons for this are low fertility rates and a cultural resistance to allowing in-migration to compensate.

A recent World Bank report points out the problems of meeting the higher social costs of caring for the elderly with a shrinking work-force as well as a fall in domestic demand for consumer products. A few optimistic economists suggest that robotisation makes a smaller work force desirable.

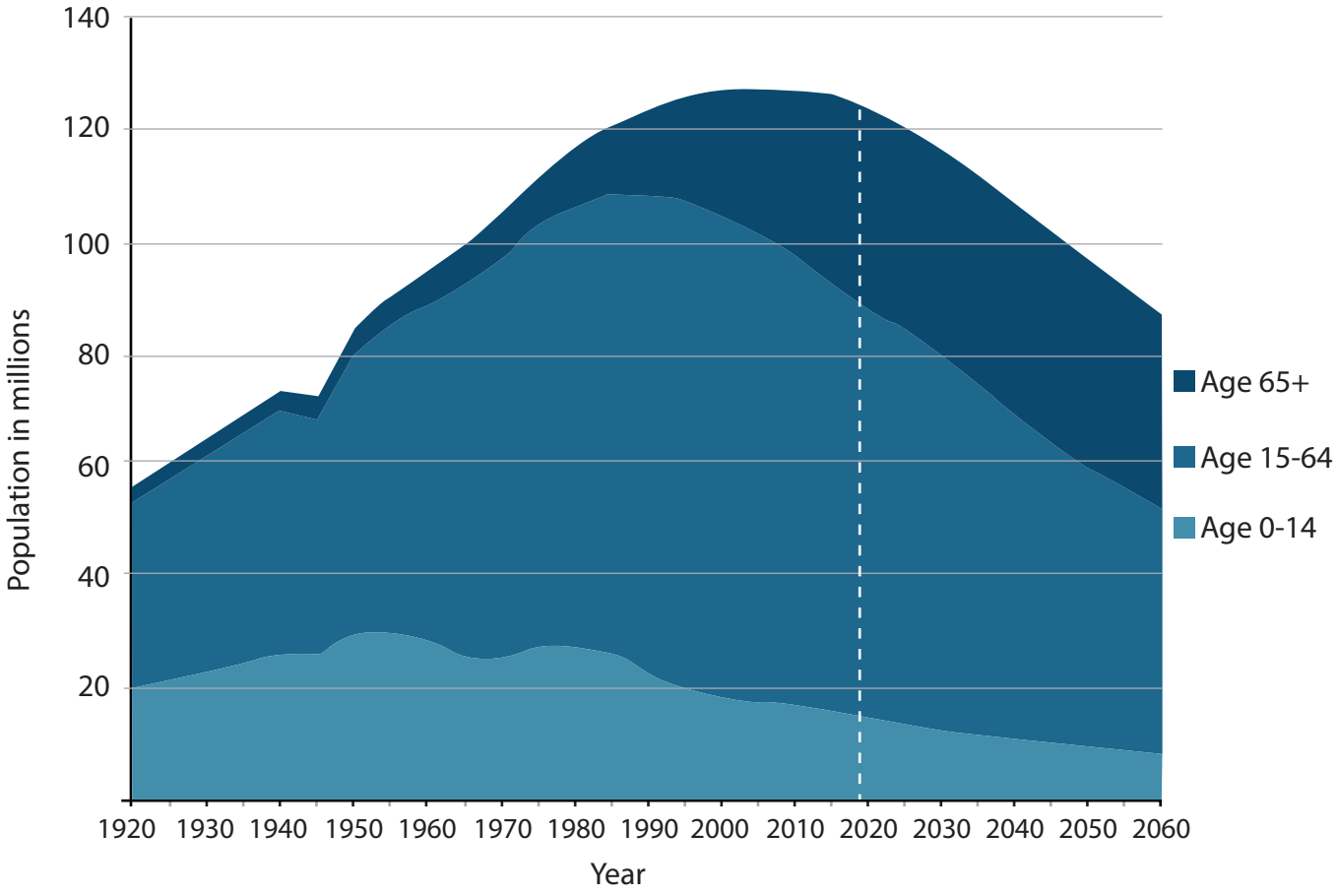


Figure 5

Past, present and projected future changes in the structure of Japan's population

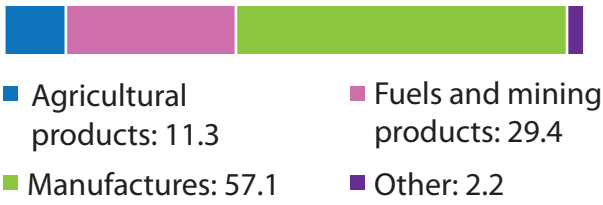
Japan's economic system contrasts with that of most of its competitors. 90% of the employees of TNC's such as Sony and Toyota are lifetime employees and the companies often provide their own schools, hospitals and retirement homes.

Japanese workers have a reputation for working very long hours with 80-hour weeks not uncommon. However, the gap between their wages and that of their bosses is the lowest of the major economies.

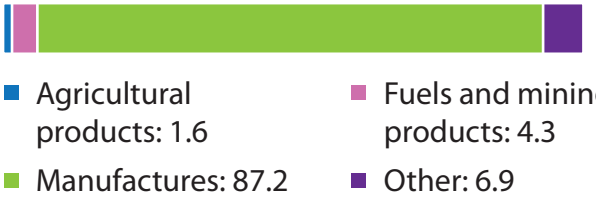
In the 1950s Japan developed its manufacturing base with a policy of import substitution industrialisation (ISI). ISI involved the government imposing high tariffs on imports making them expensive so replacing previously imported goods such as cars with Japan's own 'home-made' products often with government subsidies to make them even more competitive.

Once these home markets were secured, Japan began to promote free-trade policies so that it could sell its goods overseas (see Figure 6a and Figure 6b).

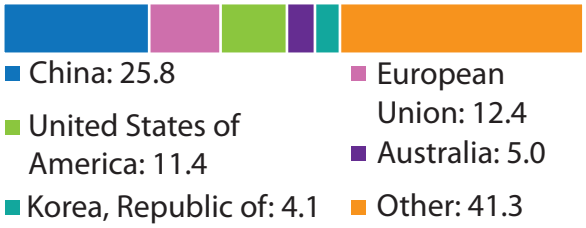
Imports by main commodity group % 2016



Exports by main commodity group % 2016



Imports by main country of origin % 2016



Exports by main destination % 2016

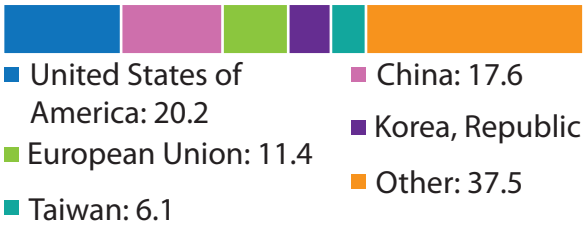


Figure 6a

Japan's trade profile, 2016

Japan ranks 4th globally for the value of its exports and 5th for its imports – exporting US$644 bn and importing US$606 bn in 2016.

Japan has a deserved reputation for innovative hi-tech products especially in the development of robotics and renewable energy technology.

Top 5 Exports		**Top 5 Imports**	
Commodity	Value in US$bn	Commodity	Value in US$bn
Motor cars	92	Oil and petroleum	51
Parts for motor vehicles	32	Liquified natural gas	34
Electronic circuits	24	Electronic circuits	17
Laser machines	13	Medicines	17
Electronic machines	12	Coal	17

Figure 6b

Japan's leading exports and imports by value, 2016

Japan began its nuclear power programme in 1954 planning to supply at least 50 % of the country's energy needs by 2000. Initially using imported US technology, they have rapidly developed their own expertise.

The Fukushima accident caused by the 2011 tsunami led to the shutdown of almost all of Japan's nuclear power plants but in 2015 the decision was made to restart that programme alongside significant research spending on renewable energy resources.

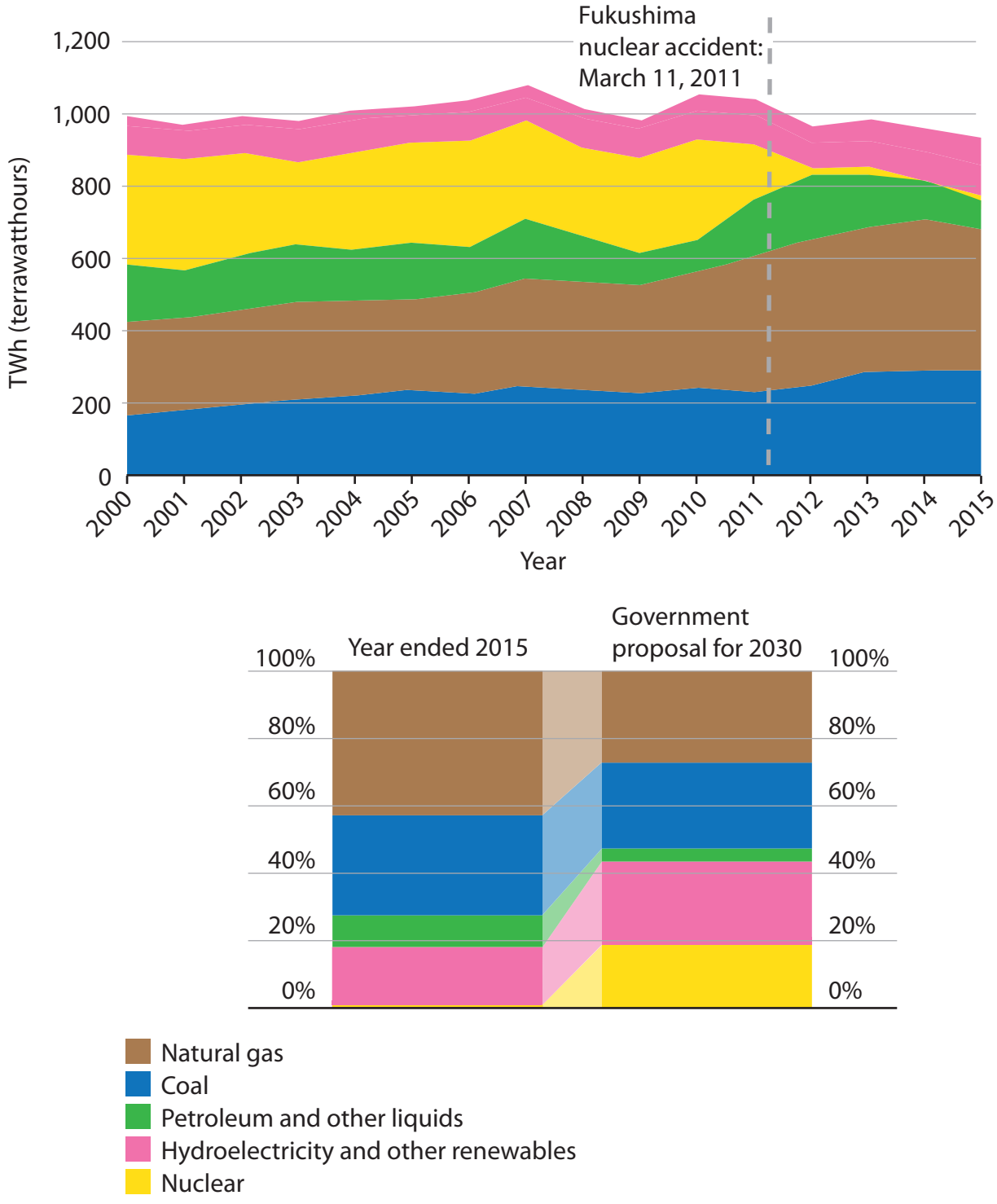


Figure 7

Japan's past and future energy mix

SECTION C

Japan – rising or falling in the superpower stakes?

Country	Overall ranking for globalisation	Ranked by Economic factors	Ranked by Social factors	Ranked by Political factors
USA	27	54	30	19
Japan	39	78	48	34
Russia	48	125	52	20
China	71	121	81	44
Brazil	73	124	106	9
India	107	143	147	22

Figure 8

The globalisation rankings (on the KOF index) for six superpowers and emerging superpowers, 2016

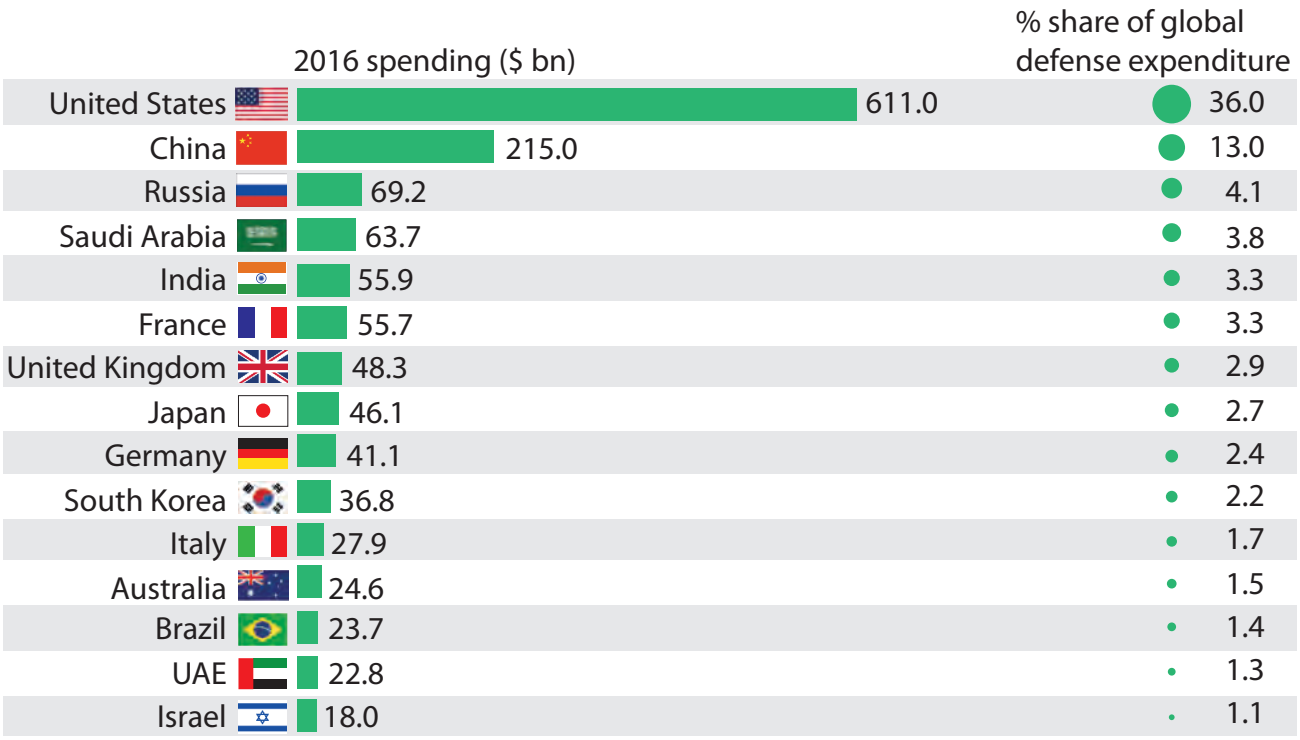


Figure 9

Defence expenditure for the world's top 15 military powers, 2016

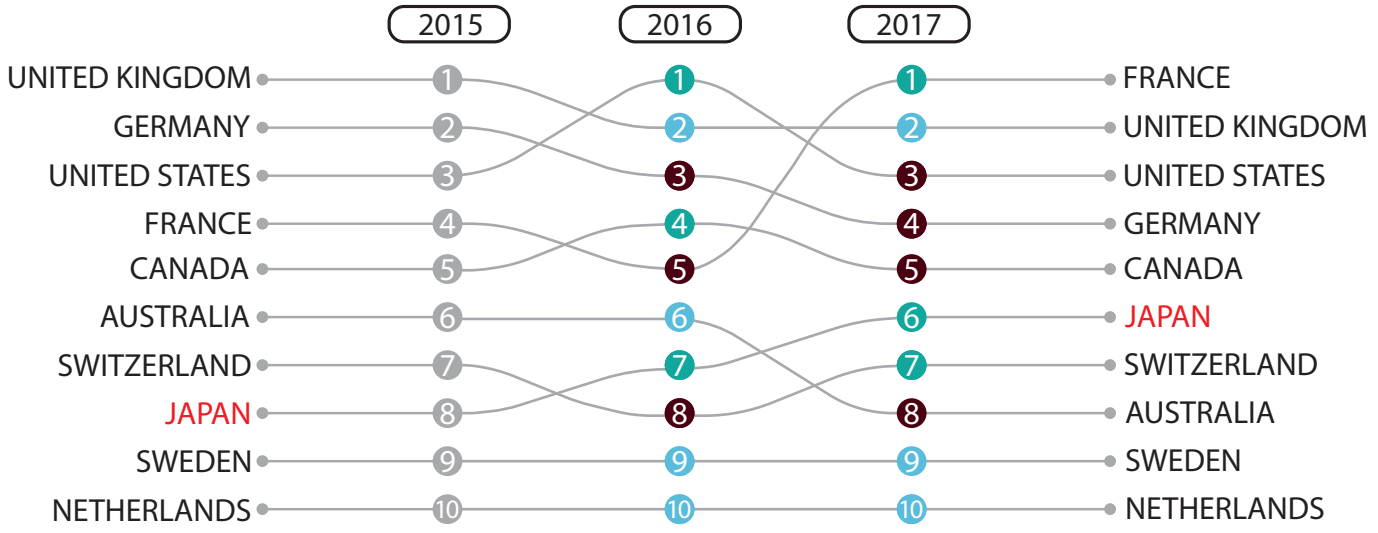


Figure 10

A 'soft' power league table showing changes in global influence measuring diplomacy, culture, education and other factors, 2015-2017

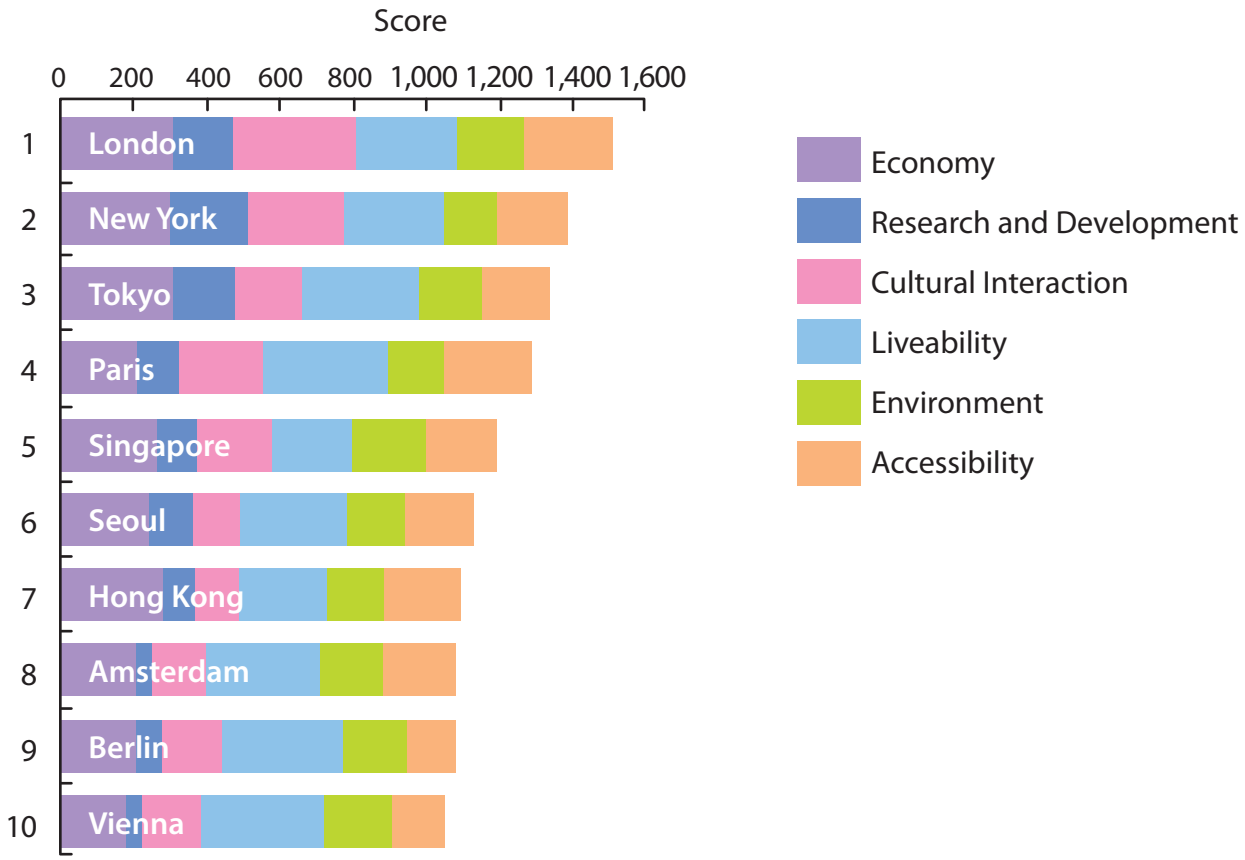


Figure 11

The results of a business survey ranking the top ten global cities in 2017

In assessing the risks from five hazards (river flooding, earthquake, wind storm, storm surge and tsunami), insurance companies have calculated that Japan has three cities in the top ten at risk globally for the number of people affected (killed, injured or displaced).

In terms of economic losses these three Japanese cities fill the first three places globally with potential GDP losses as high as 5% of the annual total.

City or city region	Total population potentially affected (in millions)
Tokyo (Japan)	57.1
Manila (Philippines)	34.6
Pearl River Delta (China)	34.5
Osaka-Kobe (Japan)	32.1
Jakarta (Indonesia)	27.7
Nagoya (Japan)	22.9
Kolkata (India)	17.9
Shanghai (China)	16.7
Los Angeles (USA	16.4
Tehran (Iran)	15.6

Figure 12

Predicted impacts for the world's 10 most hazardous cities and city regions

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Figure 1 - Source from: https://www.researchgate.net/figure/Topography-and-main-geographical-regions-of-Japan-modified-from-Editorial-Group-for_fig3_308023935

Figure 3 - Shake-up time for Japanese seismology', Robert J. GellerCopyright © 2011, Springer Nature

Figure 4 - Sourced from: © popdensitymap.ucoz.ru

Figure 7 - Sourced from: U.S. Energy Information Administration